MODERNIZING TRANSPORTABLE TEAMWORK COMPETENCY TRAINING

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MODERNIZING TRANSPORTABLE TEAMWORK COMPETENCY TRAINING

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SUMMARY

In today's workforce, employees work in a variety of team contexts and need to know how to effectively work in teams. Research provides abundant recommendations on how to improve team functioning and effectiveness through individual and systemic means (Cannon-Bowers et al., 1995; Hackman, 2012). As the workforce changes, our research needs to evolve with it. Employees are not just members of teams, they engage in teaming (Edmondson, 2013). It is important that we understand and develop an individual's readiness to work in teams.

Generic teamwork competencies have been researched and discussed for the last 30 years and these competencies are often the focus of determining an employee's ability to work in a team (Baker & Salas, 1992; Cannon-Bowers et al., 1995; Morgan et al., 1986; Salas et al., 2002). While most of these competencies hold up today, there are two ways to modernize. First, many researchers agree that leadership is a key teamwork competency (Cannon-Bowers et al., 1995; Cullen-Lester et al., 2017; Salas et al., 2005). Modern teams have employees engaging in leadership in a variety of formal and informal ways, so it is important for employees to understand shared leadership. One goal of this dissertation is to make shared leadership an explicit teamwork competency that should be included when training teamwork readiness. The second way to modernize training is to focus on readiness for teaming. Teamwork competencies mainly focus on required that can be identified, trained, and transferred to the workforce. Readiness is more than just a collection of required skills; it is the capacity to engage in an activity. If employees are teaming, then researchers should examine their readiness for teaming. The second goal of this dissertation is to define and describe collaboration readiness, or the readiness and ability to engage in

teamwork (Rosas & Camarinha-Matos, 2009; Balasooriya et al., 2013; Castner, 2012; Morgan et al., 1986) Collaboration readiness is an individual construct with five dimensions: motivation, knowledge of skills, cognitive strategies, self-efficacy, and enthusiasm for teaming. This definition is based on readiness in learning and teamwork readiness research (Conley, 2012; Eddy et al., 2013; Le et al., 2005, Lotrecchiano et al., 2016).

Both foci aim to address how to modernize developing teamwork ability in employees. In this project, participants were exposed to training programs to teach generic teamwork competencies (including shared leadership) while they worked on a team project. Participants were in one of four conditions: Control, leadership skills only, teamwork skills only, and teamwork and leadership skills. All four conditions included a team contract. In the control condition, participants were only given a team contract to complete. The leadership skills condition included training on shared leadership. The teamwork skills condition included training on value of teams, managing diversity, developing norms, and conflict management. The teamwork and shared leadership condition were a combination of the two previously described conditions. By having these four conditions, I tested to see if the shared leadership condition would have a learning impact that was unique to that condition. Additionally, participants were tested on the five dimensions of collaboration readiness before and after their training to test if training would lead to differences in readiness.

To test if shared leadership training would have an impact on individuals, participants were tested on their knowledge of engaging in shared leadership and teammates reported on shared leadership behaviors. There was no change in knowledge

when comparing participants before and after training. When comparing shared leadership behaviors, those who received shared leadership training were more likely to engage in shared leadership than those who did not receive the training. Thus, those who received shared leadership training were more likely to report relying on multiple others for leadership. While the training had no impact on knowledge of shared leadership, it's possible the training provided a behavioral framework that participants could follow to know how and when to influence others, and teammates could recognize that influence. Current research does not focus on training shared leadership, so this study provides knowledge to help address this gap.

Collaboration readiness addresses a problem of needing to match our scholarly knowledge with modern teamwork. The term collaboration readiness has been used regarding teams but focuses on the readiness of a system for teamwork (e.g., department, organization). Additionally, research supports the idea that teamwork training is best learned in intact teams which leads to preparing teams for teamwork, not individuals. It is not practical to only focus on training intact teams when employees are working in several teams and need to engage with all their teams. Thus, there is a need to focus on what makes an individual ready for teamwork. To address this need, I developed the construct of collaboration readiness with five dimensions based on research from education and team science fields: motivation to engage in teamwork, knowledge of skills, cognitive skills to monitor current teamwork behavior, and positive attitude towards future teamwork. The current study used collaboration readiness as the main outcome variable to examine the differences between receiving training and not receiving training.

For the most part, training had no impact on collaboration readiness except for cognitive skills and motivation. An individual's ability to monitor their own teamwork behaviors was greater in those who received team skills training compared to those who did not. Intrinsic motivation had an interaction effect, whereas the combined team skills and leadership training reduced intrinsic motivation compared to each component training. This interaction could be explained by trainees feeling overburdened in the full training which may have impacted other results in the study.

The results of this study show that cognitive skills were improved in the team skills training whereas leadership behavior was improved in the shared leadership training, but a combined impact of both trainings led to a decrease in motivation. This study provides a foundation for future research in several areas. A relational focus in training is not often used, but has real impacts when studying teamwork, especially shared leadership in teams. As research grows in training shared leadership, so does the need to understand how researchers can see behavioral differences using network analysis methods versus other methods. Additionally, as the workforce and training methods modernize, scholarly understanding also needs to modernize. Individuals need to be able to engage in teaming and scholars need to be able to measure teaming within an individual. This study's conceptualization of collaboration readiness provides a springboard for future research of individual's teaming.

CHAPTER 1. INTRODUCTION

Teams are ubiquitous in organizations. As the use of teams has grown, scholarly understanding of teams and teamwork has evolved. Teams need to collaborate effectively but doing so requires individuals to understand how to collaborate and lead. Modern day workplaces require individuals to be ready to work in a variety of teams at any time, adjusting to each team's needs (Edmondson, 2013). This agility requires individuals to possess skills that enable them to work and lead effectively in any team, regardless of the conditions or experiences of the team.

A team is an entity that, with the right enabling conditions, should collaborate well and perform effectively (Hackman, 2012). All responsibility for team effectiveness is placed in the hands of management and organizations (who control the team conditions), rather than an individual's ability to work with others. By shifting the focus from the team as an entity to the action of teamwork, or teaming (Edmondson, 2013), the individual becomes of interest. This distinction is important for modern teams, where individuals work in many teams simultaneously or change teams frequently. When individuals engage in teaming, they utilize transportable teamwork skills. These skills are key generic teamwork competencies individuals should possess to be successful teammates (Salas et al., 2002). Transportable teamwork skills are well-researched and are not debated here, rather key aspects of training these skills need modernizing.

First, leadership is an often-cited transportable teamwork skill, but the extensive work on training leaders does not meet the needs of a modern team. Traditionally, leadership is viewed as a specialized position a person holds wherein a person exercises

authority and power (Yukl & Gardner, 2019). Training has often reflected this position, with emphasis on developing a person with positional power (Day, 2001). Similar to the shift in terminology to teaming to describe active teamwork, researchers argue that leadership training has focused too much on the leader and not leadership. Leader training focuses on developing those who are in or aim to be in managerial positions, whereas leadership training places more emphasis on understanding and developing influence through relations with others (Day, 2001; Lacerenza et al., 2017). This view aligns with current team leadership research on shared leadership, a theory describing leadership roles as shared across team members throughout the life of the team and does not require formal authority or status (Contractor et al., 2012; D'Innocenzo et al., 2016). Considering the knowledge that shared leadership positively impacts teams, there is a lack of practical guidance on how to develop shared leadership (Cullen-Lester et al., 2017; Eva et al., Tafvelin et al., 2018; Wang et al., 2014). To train transportable teamwork competencies that are valid for today's workforce, leadership training research needs to expand to include shared leadership.

Second, even though previous research identified key generic teamwork competencies and promoted training those at an individual level (Salas et al., 2002), team science lacks a concept of individual readiness for teamwork (Ellis et al., 2005). This oversight is more problematic in a modern era where individuals engage in teaming in multiple teams at the same time. Such a readiness measure can be used for selection or training purposes. This concept of readiness is more than an assessment of teamwork skills and focuses on an individual's socio-cognitive readiness for teamwork. Such an outcome

would indicate how prepared an individual is for teamwork and be beneficial for understanding workers who are teaming.

This study has two main goals of modernizing our understanding of team training. First is developing a shared leadership training and measuring the changes in individuals in that training compared to those in a generic team skills training. Second is to introduce the concept of an individual's collaboration readiness and measuring it in transportable teamwork competency (including shared leadership) training.

1.1 Shared Leadership Training

Leadership is an important aspect of teams and is often cited as a teamwork competency (Cannon-Bowers et al., 1995; Salas et al., 2005). Training leaders is a large business in corporate America, with a wide range of research on the effectiveness of leader development programs (Burke & Day, 1986; Collins & Holton, 2004; Fiedler, 1996). Leadership training is effective yet is often only considered for training employees with formal authority over others (Lacerenza et al., 2017). Organizations rely less on top-down managing and leading than in the past and have shifted toward self-management (Lacerenza et al., 2018). This shift from hierarchical leadership (leader in a formal authority role positioned hierarchically above others; Pearce & Sims, 2002) to shared leadership has been explored by researchers who found these are distinct types of leadership that have different impacts on team performance (Nicolaides et al., 2014; Wang et al., 2014). Thus, training that has been developed based on hierarchical leadership theories are not appropriate for training shared leadership.

Shared leadership describes leadership duties and behaviors as distributed throughout the team (Carter et al., 2015; D'Innocenzo, et al., 2016). When teammates have

similar levels of formal authority over each other, influence can emerge from several, sometimes informal, sources (Mehra et al., 2006; Pearce & Conger, 2003). Modern leadership development should focus on how individuals influence through informal authority and share leadership with other teammates. Current methods of leadership or team training are inadequate for fostering shared leadership specifically because they were not developed for shared leadership (Cullen-Lester et al., 2017; Eva et al., 2019; Lacerenza et al., 2018). Research on existing training programs that focus on hierarchical leadership still have broader value to inform what a shared leadership training program should consider. These training programs aim to change values and behaviors by enhancing the knowledge, skills, and abilities in individuals (Barling et al., 1996; Day, 2001; Lacerenza et al., 2017). Training shared leadership should go further and incorporate a relation-focused approach (Cullen-Lester, et al., 2017; Day, 2001; Kjellström et al., 2020; Lacerenza et al., 2017). Modernizing the transportable teamwork competency of leadership means broadening leadership training to include shared leadership. This type of training should help individuals understand themselves as a leader and the relations that impact influence.

Shared leadership training can be presented to trainees using the framework proposed by Contractor and his colleagues (2012). They defined shared leadership on three dimensions: person, function, and time. The first dimension, person, suggests that more than one person on the team is an influencer. Teammates create a pattern of leadership relations characterized by influencing and working with other influencers. The second dimension, function, suggests that teammates share different leadership roles, such as initiating structure or empowerment. Employees use different strengths or attributes to

influence the team through specific leadership behaviors. These two dimensions demonstrate why it is important to consider the individual as well as the relations. The third dimension, time, recognizes that teamwork is dynamic and that *who* is influencing and *how* they are influencing can shift over the life of a team. Employees must recognize influence should shift over time based on team needs.

This three-dimensional framework provides the content of a shared leadership training, so what remains to be discussed is the development and assessment of that training. Shared leadership training should show differences in knowledge and behaviors before and after, as well as differences from other transportable teamwork competencies. The need for assessment highlights a larger gap in team training research. This study proposes that shared leadership is a transportable teamwork competency, something that any *individual* should learn and use on any team. Yet there are no adequate measures of individual collaboration readiness (Eddy et al., 2013). Such a measure would be appropriate to compare different types of transportable teamwork competency training. Thus, the second goal of this dissertation is to develop the construct of collaboration readiness.

1.2 Collaboration Readiness

Readiness is the preparedness, mentally or physically, for some experience or action (Merriam Webster). Many representations of readiness share similar themes. For an individual to be 'ready', they must possess the required domain knowledge (ACTE, 2010; Conley, 2012; Eddy et al., 2013; Le et al., 2005), belief he or she can do the future activity (Conley, 2012; Eddy et al., 2013; Le et al., 2005), motivation to do the future activity (Conley, 2012; Le at al., 2005; Lotrecchiano et al., 2016), cognitive skills that promote the

ability to do the future activity (ACTE, 2010; Conley, 2012; Kluge & Burkolter, 2013; Lotrecchiano et al., 2016), and positive affect regarding the future activity (Eddy et al., 2013; Le et al., 2005; Parsell & Bligh, 1999). These definitions are based on readiness research in education, science, military, team science, and medical domains.

For this study, I introduce the concept of collaboration readiness, which is built on the ideas of 'readiness' for use in teamwork. The need for such a definition is apparent in our current research on several fronts. First, researchers often use the term collaboration readiness as a description of a system rather than individual (Cooke & Hilton, 2015; Hall et al., 2008; Rosas & Camarinha-Matos, 2009). Individual collaboration readiness is not often considered. Second, team training research recommends training within a team to improve team outcomes. This orientation captured much of the training and readiness research, while an individual's capacity is overlooked. These views of collaboration readiness are not incorrect and provide significant advances in their own right. The problem arises when one is interested in training teamwork for an individual rather than a team. The majority of team training research focuses on training a team and measures team outcomes, which is appropriate when researchers are interested in the team. The focus of this study is not teams but of individuals and it is necessary to have an outcome suited for an individual's collaboration readiness, not a measure of the team or organization (Eddy et al., 2013).

There are existing efforts to measure an individual's capacity to work in a team, despite the major focus on readiness at a team or system level. Stevens and Campion's (1999) designed the Teamwork Knowledge Skills, and Abilities test as a selection instrument to identify who works best on a team. Mumford and his colleagues (2008)

developed a Team Role Test designed to assess knowledge of team roles for use in a selection context. Both are popular methods of looking at teamwork at an individual level, but they differ significantly from the goals and needs of a collaboration readiness construct. Both rely on knowledge and application of knowledge, but there is no mention of assessing attitudes, motivation, or cognitive strategies for teamwork in either test. Both assume a single correct answer to a work context, which may not be appropriate for a collaboration readiness measure for generic teamwork competencies. Finally, both have the context of a generic company setting, which may not be appropriate for all employees. A collaboration readiness test should go beyond these teamwork assessments by measuring attitudes, motivation, cognitions as well as knowledge and behavior.

An appropriate definition for collaboration readiness of an individual is the capacity of an individual to engage in teamwork and described by five dimensions: (a) motivation to engage in teamwork, (b) possession of required knowledge of skills, (c) possession of cognitive skills to monitor current teamwork behavior, (d) belief that they are capable of teamwork, and (e) a positive attitude toward future teamwork. These dimensions are distilled from the most common themes and definitions of readiness research. This multidimensional construct allows for a deeper understanding of an individual's readiness for teaming that goes beyond previous attempts at individual measures of teamwork. Each dimension of collaboration readiness is described below.

1.2.1 Motivation

This dimension assesses an individual's motivation to work collaboratively. Many frameworks of readiness broadly define motivation to be an inner drive towards work, including self-efficacy or goal setting. Both self-efficacy and goal setting (cognitive

strategy) were often cited either alone or under the umbrella of motivation (Conley, 2012; Eddy et al., 2013), and are distinct dimensions outside of motivation for the purpose of collaboration readiness. For this motivation dimension, I focus on the drive towards exerting effort for the benefit of others.

1.2.2 Knowledge of Skills

This dimension assesses an individual's knowledge regarding teamwork interactions. Having the underlying knowledge required for future action was a common theme in several frameworks. This is where previous teams' researchers' frameworks fit best, such as the Team Knowledge Skills and Abilities test or Team Roles Test (Stevens & Campion, 1994, 1999; Mumford et al., 2008). Considering the limitations of those tests, it is best for this dimension to focus on the actual knowledge of skills as well as the understanding of one's knowledge of teamwork skills. If using collaboration readiness to assess training, this is the only dimension that needs specification to the training, as the measurement of knowledge should reflect the knowledge taught in the training.

1.2.3 Cognitive Strategies

This dimension assesses an individual's ability to monitor their current teamwork behavior. Individuals need to know the necessary knowledge of skills but also the ability to plan and assess the use for those skills. Several readiness frameworks included two types of cognitive strategies, ones focused on current activities and ones focused on transitioning to future activities. These strategies include goal setting, critical thinking, time management, or problem-solving (Conley, 2012; Kluge & Burkolter, 2013). For collaboration readiness, it is important for individuals to recognize what teamwork

strategies are being used, when strategies should be used, and to assess what is working or what needs to change.

1.2.4 Self-Efficacy

This dimension assesses an individual's belief that they are ready for teamwork. Many frameworks note the importance of individuals believing in their ability to do the future activity. This self-efficacy for teamwork should not be confused with team efficacy, the belief that the team can accomplish the given task (Gibson, 1999). The key differences lie in the level and orientation. This collaboration readiness dimension is focused on the individual and their belief in their teamwork skills, rather than a belief in a specific team's ability to succeed. Self-efficacy literature is more relevant for guidance of how to conceptualize this dimension than team efficacy research (Scholz et al., 2002).

1.2.5 Enthusiasm for Teaming

The final dimension assesses an individual's attitude towards working in teams. The term enthusiasm for teaming is reflective of work by Eddy and his colleagues (2013) on this subject and refers to a general affective state on a person's desire and willingness to work in teams. This is different from viability which focuses on the desire for the continuation of a current team (Bell & Marentette, 2011). This final dimension rounds out the collaboration readiness model by including an attitudinal component towards working in teams. Research on an individual's orientation towards group work has shown to impact team performance (Dierdorff et al., 2011).

1.2.6 Summary

Eddy and his colleagues (2013) recognized the importance developing an individual's readiness for teamwork for today's workplace. They believed that to develop this readiness, individuals should work in team settings and experience effective teamwork. These team experiences improved an individual's collaboration readiness. The key drawback to their study was the limited measurement of collaboration readiness. Readiness is more than simply asking employees if they feel prepared for the task. Research on readiness shows that it is a multidimensional construct, thus collaboration readiness should also reflect these different dimensions.

Collaboration readiness pairs well with training transportable teamwork competencies. The goal of such training is to enhance a person's basic teamwork skills. Having such skills should show a readiness for teamwork. Modernizing the training of transportable teamwork competencies should include collaboration readiness as an outcome variable. In this study, collaboration readiness is the main outcome of interest. The other main proposition of this study is to train shared leadership as a way to modernize transportable teamwork competency training. The efficacy of shared leadership training was assessed by comparing it to other experimental training groups using collaboration readiness as an outcome measure. The other experimental groups consist of a control group, a teamwork only group, and a full training group. The teamwork skills training focused on the transportable teamwork skills other than leadership. Next, the other transportable teamwork competencies will be described as well as the training process for all the competencies.

1.3 Transportable Teamwork Competency Training

Transportable teamwork skills focus on managing the interpersonal relationships between teammates (Davis et al., 1985; Morgan et al., 1986). There are several generic teamwork skills identified in the literature: communication (Baker & Salas, 1992; Cannon-Bowers et al., 1995; Davis et al., 1985; Morgan et al., 1986; Stevens & Campion, 1994, 1999; Watson, 2002), coordination (Baker & Salas, 1992; Cannon-Bowers et al., 1995; Davis et al., 1985; Morgan et al., 1986; Stevens & Campion, 1994, 1999), conflict management (Cannon-Bowers et al., 1995; Davis et al., 1985; Morgan et al., 1986; Oakly et al., 2004; Riebe et al., 2010; Stevens & Campion, 1994, 1999), adaptability (Baker & Salas, 1992; Cannon-Bowers et al., 1995; Salas et al., 2005), performance monitoring and feedback (Baker & Salas, 1992; Cannon-Bowers et al., 1995; Riebe et al., 2010; Salas et al., 2005; Stevens & Campion, 1994, 1999; Watson, 2002), leadership (Cannon-Bowers et al., 1995; Riebe et al., 2010; Salas et al., 2005; Watson, 2002), and team morale/collectiveness (Baker & Salas, 1992; Cannon-Bowers et al., 1995; Salas et al., 2005). This list is not exhaustive of all the theories or frameworks for transportable teamwork competencies (for an in-depth analysis of these theories, see Rousseau, Aube, and Savoie's, 2006 review) but provides a summary of common overlaps between theories. For this study, these generic competencies were represented in multiple training sessions centered on five themes: Value of the team, managing diversity, shared leadership, team norms, and conflict management.

One of the main contributions from team training research are the diverse methods to conduct and develop training. The most effective training approach uses four principles: Present relevant information to be learned; demonstrate the knowledge, skills, and abilities

to be learned; allow opportunities for individuals to practice training; and provide feedback throughout the training and post-training (Salas & Cannon-Bowers, 2001). A recent meta-analysis showed that training interventions targeting preparation, execution, and reflection enhanced team performance and team dynamics (McEwan et al., 2017). Not only should the training focus on developing teamwork knowledge, acquiring skills, and fostering a collectivist attitude, but it should also explicitly discuss preparation and execution. With these results in mind, the training was developed to focus on self-awareness, practice, and reflection for each competency.

Appendix A details each of the training sessions and includes explicit instructions and assignments. Each theme, and a description of its training session, follows:

1.3.1 The Value of Teamwork

The first competency focuses on preparing for teamwork by fostering a collectivistic attitude. It is important for individuals to understand how and why the team skills they are learning relate back to their work (Balasooriya et al., 2013). To help create this connection, this first skillset should directly address why teamwork is important for the employee as well as the benefits of working in a team. The value of teamwork session attempts to address the attitudinal change necessary for enhancing collaboration readiness by providing information and reflection of the importance and necessity of teamwork. I advance the following instructional objective for team training:

Instructional objective #1: Individuals learn why we work in teams and make attitudes toward teamwork salient.

The training for this competency was completed by participants individually on their own time. They were given the instructions and about one week to complete the

training. The training began with a video created by the author that discussed the value of teamwork. After viewing the video, participants were asked to personally reflect on the video as well as themselves as they prepared to work on a team project for the next few months. Participants were then asked to complete the StrengthsFinder online assessment and personally reflect on those results. The reflection from the StrengthsFinder assessment would be referenced in the next training, managing and leveraging diversity. It is estimated that completing this session took 40 minutes.

1.3.2 Managing and Leveraging Diversity

Managing diversity is not an often-cited teamwork competency, but it does require common competencies such as communication and collaboration. Focusing on diversity allows employees to understand what they contribute to the team, what others contribute to the team, and allows planning for diverse values and methods of working. Specifically identifying the differences between individuals helps them to communicate and integrate differences into teamwork (Maznevski & DiStefano, 2000). With an eye towards a modern view of transportable teamwork competencies it is important to recognize the diversity in our workplaces and how each employee is a different type of teammate. The point is not to focus on the causes of diversity, but recognize they exist and provide training to best integrate the diversity into a plan of action. The managing and leveraging diversity session aims to achieve that integration, thus I advance the following instructional objective for this session:

Instructional objective #2: Individuals learn how to manage and leverage the differences between teammates.

The training for this competency was completed by participants in a live workshop facilitated by a researcher related to this project, but not the author. This training occurs right as work on the team project begins and immediately following the due date of the Value of Teams session. The facilitator began with a re-introduction of the team training project and asked participants to work with their team on this workshop. The first task was for individuals to share their StrengthsFinder results and reflection with the group. This step allowed teammates to understand the similarities and differences between team members by using a common language. Next, individuals completed a StrengthsFinder "I hate" statements worksheet. On this worksheet, individuals identified their top five Strengths and their associated "I hate" statement. From those five statements, individuals chose the statement that most resonated with them. After each person in the team chose their top statement, the team discussed how their statements would impact working with one another in a team. After this discussion, the team completed a worksheet to plan how the team will avoid or handle each person's "I hate" statement. This step allowed the team to recognize how their differences could manifest in their teamwork. This session took about 50 minutes to complete.

1.3.3 Shared Leadership

As described previously, leadership is an important teamwork competency. To modernize training of transportable teamwork competencies, this session focused on shared leadership. The session aims to educate individuals on recognizing shared leadership and how to share influence.

Instructional objective #3: Individuals learn how to share influence with others within their team and recognize leadership from multiple sources.

The training for this competency was completed by participants in a live workshop led by the author. This training occurred right as work on the team project begins or a week after the Managing Diversity training. The session began with individual's reflecting on their leadership positions and their leadership desires for the current team. Following the individual reflection, participants worked with their team on a logic puzzle. The puzzle is a task to elicit coordination and influence attempts. After all groups solved the puzzle or 20 minutes (whichever comes first), the facilitator asked the groups to reflect on who they viewed as a leader and why. This was followed by a 10-minute lecture by the facilitator about shared leadership based on the model by Contractor and his colleagues (2012). The session ended with the development of a leadership plan by each team, wherein each individual identified what role they would take within the team and how it related to a person's strength. This session took about 50 minutes to complete.

1.3.4 Norm & Goal Development

All teams have explicit or implicit norms and team goals. Norm development has been widely cited as necessary for team functioning, and team contracts have been used formally and informally to help team members collectively discuss and agree on norms (Aaron et al., 2014; Asencio et al., 2012; Borrego et al., 2013; Mathieu & Rapp, 2009). Norms will develop with or without this formal process. The benefits of a contract allow for individuals to agree on and be aware of norms and goals. Teams completing team contracts take the time to discuss team goals as well as individual goals. While everyone may agree on and understand the purpose of the team, not everyone will have the same reason or goal for being part of the team. Developing a shared cognition of understanding norms and goals is beneficial for teams (DeChurch & Mesmer-Magnus, 2010). Not all

teams take the time to develop shared understanding, or they mistakenly believe that shared understanding exists. In this session, individuals identify norms and goals within their team, addressing the communication, coordination, and team monitoring competencies. The instructional objective for this session is:

Instructional objective #4: Individuals learn how to set norms, plan, and coordinate for the team.

The training for this competency was completed by participants on their own time. Participants were given the instructions for the training immediately following the previous training session, either Shared Leadership or Managing Diversity depending on the experimental condition. The training began with an individual assignment of watching a video created by the author that discussed setting team norms. After the video, participants reflected individually on what norms were personally relevant and how they related to their Strengths. After each team member completed the individual assignment, the team worked together to complete a team contract. The session takes about 50 minutes to complete, and participants were given a week to complete the training.

1.3.5 Conflict Management

Conflict management is a highly popular topic in research and practice (Behfar et al., 2008; DeChurch & Marks, 2001; De Wit et al., 2012; Thomas, 1992). Of all the team processes and states, team conflict is the most identifiable and troubling for team members and supervisors. Conflict arises from the interpersonal and task related clashes among team members (DeChurch & Marks, 2001; De Wit et al., 2012). Generally, people do not like conflict, but not everyone is skilled in managing conflict. Across multiple teams an individual can experience different types of conflict and diverse methods of managing

conflict. Team training often provides guidance on how to deal with conflict and is considered a necessary component of training.

Individuals need to be instructed about the type of conflict (e.g., task, relationship) as well as methods of conflict management (DeChurch et al., 2013). Different patterns of task, relationship, and process conflict impact a team's functioning and performance (De Wit et al., 2011; O'Neill & McLarnon, 2018). While there are assumptions of the best way to deal with conflict (collaborative or compromising; De Dreu & Van Vianen, 2001), different methods of managing conflict are required depending on the situation and conflict experienced (De Dreu & Van Vianen, 2001; Von Glinow et al., 2004).

The challenge with training conflict management is often the fidelity of the training. Not every team experiences conflict, and team conflict is often resolved by the actions of specific people on that team. The goal is to train a transportable competency; thus, individuals should learn how to manage conflict in a variety of situations. This session took an individual focus by teaching about conflict and conflict resolution and helping participants understand how they tend to manage conflict both in general and specific situations. Additionally, individuals were provided guidance on how to have the difficult conversations that arise when experiencing conflict with teammates. The following is the instructional objective for conflict management:

Instructional objective #5: Individuals learn diverse types of conflict and methods of managing conflict.

The training for this competency included individual pre-workshop work as well as team assignments in a live workshop. Participants were given the instructions for the training immediately following the Team Norms session and given about two weeks to

complete the individual pre-work before the workshop. This session is purposefully last, as it happens at about the halfway point in the team project. Research indicates that the halfway point is often a critical time of transition for the team (Gersick, 1988) and thus this training session is a just in time training enabling individuals to navigate conflict. The training began with an individual assignment of watching a video created by the author that discussed conflict management. After the video, participants completed a conflict management style assessment and reflected on the results. These results were referenced in the live workshop led by a researcher related to this project but not the author. The facilitator started the workshop with a review of the pre-work and instructed team members to discuss their conflict management style and reflection with their teams.

After this discussion, teams were given four scenarios and instructed to discuss the best way to resolve the conflict. The scenarios explored common problems faced by their teams but do not have a single solution. The facilitator visited with teams and engaged in discussions to help further reflections. The goal of this assignment was for individuals to see their teammates' conflict management styles in action as well as to see how different situations may call for different methods of resolving conflict that are unlike default methods. Following this discussion, the facilitator discussed how to have a difficult conversation with a teammate using the Crucial Conversation guidelines (Patterson et al., 2002). The participants ended the session by completing a worksheet mapping out a difficult conversation they may need to have with a teammate (or someone else) as a way to help resolve conflicts. The session took about 50 minutes to complete.

1.3.6 Summary

To meet the goals of this study, there are four training conditions. All the modules, except for shared leadership, make up the team skills training for this study. The experimental conditions were exposed to either shared leadership training, the team skills training, both, or neither. The first goal of modernizing training of teamwork competencies is to develop and test shared leadership training. Thus, it has its own experimental condition to assess the efficacy of that training. The other three conditions served as comparisons to see if the shared leadership training can change perceptions of leadership and collaboration readiness uniquely beyond other transportable teamwork competency training.

The control condition did not have any of the previously describe training modules, but still had some teamwork training. The goal is for the control condition participants to have a comparable experience to the other conditions; thus, they completed a minimal teamwork training module. Participants completed the StrengthsFinder assessment but did not have the same reflection and activities as the other training sessions. They also completed a team contract with their team. They were instructed on how to complete the contract but were not given the same lecture or reflection as the Norm and Goal Development module. Research has shown team contracts to be a useful intervention for teams and a recommended starting point for new teams (Aaron et al., 2014; Asencio et al., 2012; Borrego et al., 2013; Mathieu & Rapp, 2009). Altogether, the control condition training contains some, but minimal, self-assessment and teamwork training.

The shared leadership training started the same as the control condition but followed with the Shared Leadership module described above. This allowed for consistency when comparing the shared leadership condition to the control condition, but the control condition is not enough training to truly train transportable teamwork

competencies. The team skills only training consisted of the Value of Teams, Managing Diversity, Norm and Goal Development, and Conflict Management modules. This allows a richer and more complete training than the control condition. The full training, team skills and shared leadership, consisted of all the modules.

1.4 Current Study

The overarching goal of this dissertation is to provide a modern view of transportable teamwork competencies by updating key areas. First, leadership should expand to include shared leadership, which is fundamentally different than hierarchical leadership. This fundamental difference calls for an examination of how shared leadership can be trained. Second, employees often work on a variety of teams within an organization and throughout their lifetime. It is important for both the organization and the employee that the employee is developed to be effective in teams. Current research lacks a thorough evaluation of what individual collaboration readiness looks like and how it should be measured.

To test these ideas, I have developed a shared leadership training program that was be assessed before and after training as well as compared to other levels of training. My first two hypotheses regarding the shared leadership training are:

Hypothesis 1: Individuals who receive shared leadership training show a greater increase in shared leadership knowledge over the course of a team project experience, than do individuals not receiving shared leadership training.

Hypothesis 2: Individuals who receive shared leadership training engage in more shared leadership behavior, that is, they rely on more individuals in the team for

leadership, during a team project experience, than do individuals who have not received shared leadership training.

The comparison groups for my shared leadership training are a control group, a team skills only training group, and a team skills plus shared leadership training group. My team skills only training group focused on the skillsets previously described: Value of teams, managing diversity, team norms, and conflict management. This training was developed for this study and thus the next set of hypotheses refers to the impact of team skills training on an individual.

Hypothesis 3: Individuals who receive team skills training show a greater increase in team skill-related knowledge over the course of a team project experience, than do individuals not receiving team skills training.

Hypothesis 4: Individuals who receive team skills training engage in more collaboration behaviors, that is, they are seen as making significant contributions and integral to the team, than are the individuals who do not receive team skills training.

The final set of hypotheses relate to my second study goal and compares the four groups on my collaboration readiness dimensions. It is posited that both the team skills only condition (H5) and the shared leadership condition (H6) will score higher on collaboration readiness compared to the control condition. Additionally, the combined training will be treated as a moderated effect and those in this condition will score higher on collaboration readiness compared to the control condition and the main effects. Thus, I hypothesize:

Hypothesis 5: Individuals who receive team skills training as a part of a team project experience exhibit greater collaboration readiness: (a) motivation, (b) knowledge

of skills, (c) cognitive strategies (d) self-efficacy, and (e) enthusiasm for teaming, than those who do not receive team skills training as a part of a team project experience.

Hypothesis 6: Individuals who receive shared leadership training as part of a team project experience exhibit greater collaboration readiness: (a) motivation, (b) knowledge of skills, (c) cognitive strategies (d) self-efficacy, and (e) enthusiasm for teaming, than those who do not receive shared leadership training as a part of a team project experience.

Hypothesis 7: The effect of team skills training on collaboration readiness (a) motivation, (b) knowledge of skills, (c) cognitive strategies (d) self-efficacy, and (e) enthusiasm for teaming, is moderated by shared leadership training, such that shared leadership training augments the benefits of team skills training on collaboration readiness and the presence of both trainings will exhibit greater collaboration readiness than those who receive no training.

CHAPTER 2. METHODS

2.1 Design

I conducted a quasi-experimental study sampling from College of Engineering and College of Science courses at Georgia Tech. Each course consisted of a semester-long team project where students worked in the same team on the same project the whole semester.

2.2 Sample

The research sample consisted of 33 students in the full training condition, 100 students in the team skills only condition, 72 students in the leadership only condition and 41 students in the control condition who consented to participating in the study. The final sample for analysis differed for individual-level and team -level analyses and depended on completion of the post-training survey. Table 1 shows the breakdown of the number of students by class, semester, condition and completion rate, and Table 2 shows the exclusion explanation for teams excluded from team-level analyses. Each condition consisted of at least two different courses. Some hypotheses require matched pairs across pre- and post-test whereas others require examination across post-test conditions, thus sample sizes for each analysis will vary. Team sizes ranged from 3 to 6 and the course size ranged from 20 to 82.

Table 1 Characteristics of participants.

Semester	Course	Condition	Total Consent	Completed Pretest (response rate)	Completed Posttest (response rate)	Total Teams for Team Analysis
Spring	PSYC 2015 A	Leadership	25	19 (76%)	17 (68%)	3
Spring	PSYC 2015 B	Leadership	23	15 (65%)	10 (43%)	2
Spring	MSE 4420	Team Skills	19	11 (58%)	6 (32%)	0
Spring	ME 4182	Full	21	15 (71%)	9 (43%)	2
Summer	ME 2110 A	Team Skills	18	12 (67%)	12 (67%)	2
Summer	ME 2110 B	Team Skills	14	14 (100%)	9 (64%)	1
Summer	ME 2110 C	Team Skills	16	11 (69%)	9 (56%)	2
Summer	ME 2110 D	Team Skills	18	14 (78%)	9 (50%)	0
Summer	ME 2110 E	Team Skills	14	12 (86%)	9 (64%)	1
Summer	ME 4182	Leadership	24	19 (79%)	4 (17%)	1
Summer	PSYC 2015	Control	20	15 (75%)	19 (95%)	5
Summer	ECE 4011	Control	21	10 (48%)	9 (43%)	0
Summer	CHBE 4520/4530	Full	23	20 (87%)	15 (65%)	3

Table 2 Teams excluded from team analysis.

Condition & Team	Course	Complete/ Total	Reason for Exclusion
Shared Leadership Only			
A	PSYC 2015	0/2	Lack of data and lack of team members consented. Minimum of 3 needed for team.
B	PSYC 2015	1/3	Lack of data.
C	PSYC 2015	2/4	Lack of data.
D	PSYC 2015	2/4	Lack of data.
E	PSYC 2015	1/4	Lack of data.
F	PSYC 2015	1/3	Lack of data.
G	PSYC 2015	1/4	Lack of data.
H	PSYC 2015	2/4	Lack of data.
I-M	ME 4182	-	Did not complete the training
Team Skills Only			
A	MSE 4420	1/4	Lack of data.
B	MSE 4420	3/5	Lack of data.
C	MSE 4420	1/1	Only one team member consented for data collection. Minimum of 3 needed for team.
D	MSE 4420	0/3	Lack of data.
E	MSE 4420	2/5	Lack of data.
F	ME 2110 A	1/3	Lack of data.
G	ME 2110 A	2/4	Lack of data.
H	ME 2110 A	1/3	Lack of data.
I	ME 2110 B	0/2	Lack of data and lack of team members consented. Minimum of 3 needed for team.
J	ME 2110 B	2/3	Lack of data.
K	ME 2110 B	2/3	Lack of data.
L	ME 2110 C	1/3	Lack of data.
M	ME 2110 C	0/3	Lack of data.
N	ME 2110 C	0/3	Lack of data.
O	ME 2110 D	0/3	Lack of data.
P	ME 2110 D	1/3	Lack of data.
Q	ME 2110 D	2/4	Lack of data.
R	ME 2110 D	2/4	Lack of data.
S	ME 2110 D	0/4	Lack of data.
T	ME 2110 E	0/4	Lack of data.
U	ME 2110 E	1/2	Only two team members consented for data collection. Minimum of 3 needed for team.
V	ME 2110 E	1/2	Only two team members consented for data collection. Minimum of 3 needed for team.
W	ME 2110 E	0/3	Lack of data.
Full Training			
A	ME 4182	1/3	Lack of data.
B	ME 4182	2/5	Lack of data.
C	ME 4182	1/5	Lack of data.
D	CHBE 4520/4530	1/1	Only one team member consented for data collection. Minimum of 3 needed for team.

Table 2 (continued)

E	CHBE 4520/4530	1/2	Lack of data and lack of team members consented. Minimum of 3 needed for team.
F	CHBE 4520/4530	0/1	Lack of data and lack of team members consented. Minimum of 3 needed for team.
G	CHBE 4520/4530	0/1	Lack of data and lack of team members consented. Minimum of 3 needed for team.
H	CHBE 4520/4530	1/2	Lack of data and lack of team members consented. Minimum of 3 needed for team.
I	CHBE 4520/4530	0/3	Lack of data.
J	CHBE 4520/4530	1/1	Only one team member consented for data collection. Minimum of 3 needed for team.
Control			
A	ECE 4011	1/3	Lack of data.
B	ECE 4011	3/5	Lack of data.
C	ECE 4011	2/6	Lack of data.
D	ECE 4011	1/3	Lack of data.
E	ECE 4011	1/1	Only one team member consented for data collection. Minimum of 3 needed for team.
F	ECE 4011	1/2	Lack of data and lack of team members consented. Minimum of 3 needed for team.
G	ECE 4011	1/1	Only one team member consented for data collection. Minimum of 3 needed for team.
H	PSYC 2015	2/2	Only two team members consented for data collection. Minimum of 3 needed for team.

2.3 Measures

All measures are found in Appendix B.

2.3.1 Individual differences

Several individual difference measures were assessed to understand previous experiences and personality.

2.3.1.1 Biographical data

Participants were asked their gender, age, nationality, year in school, and major at the end of the project. Due to survey errors, this was only asked of certain participants.

2.3.1.2 Previous group experience

This scale was developed and used by Rubin, Bommer, and Baldwin (2002). Participants were asked if they were currently a member of the following groups: Fraternities/sororities, clubs/organizations, and sports teams (varsity or intramural). These groups are typical for university students. Participants responded either yes or no for each of the groups. This was asked at the end of the team project.

2.3.1.3 Social Skills

This 7-item scale was developed by Ferris, Witt, and Hochwarter (2001; α=0.82). Participants responded on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree). An example item is "I am particularly good at sensing the motivations and hidden agendas of others." This was asked at the end of the team project.

2.3.1.4 Big 5

This 20-item scale includes each subscale of the Big 5 (Conscientiousness, α=0.72, openness to experience α=0.73, extraversion α=0.78, neuroticism α=0.57, and agreeableness α=0.65) and was developed by Donnellan, Oswald, Baird, and Lucas (2006). Participants responded on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree). An example item is "Sympathize with others' feelings." This was asked at the end of the team project.

2.3.2 Measures to Evaluate Training Conditions

Several measures were used to assess the efficacy of the training conditions.

2.3.2.1 Utility Reactions

This 3-item scale was adapted from Alliger, Tannenbaum, Bennet, Traver, and Shotland (1997; α=0.88). Participants responded on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree). An example item is "This training has practical value." This was asked at the beginning and end of the project.

2.3.2.2 Knowledge Test

A knowledge test was created for the competencies of shared leadership, norm development, and conflict management. Each test consisted of three multiple choice items that assessed either facts or applications regarding the material presented in the training. To test shared leadership knowledge, the shared leadership knowledge test was used. Participants averaged a score of 1.18 out of 3 in the pre-test and a score of 1.56 out of 3 in the post-test. To test team skills knowledge, the combined norm development and conflict management tests were used. Participants averaged a score of 4.09 out of 6 in the pre-test and a score of 4.27 out of 6 in the post-test.

2.3.2.3 Team Leadership

This sociometric item was adapted from Carson, Tesluk, and Marrone (2007) and was asked at the beginning and end of the project. The item is "Who does your team rely on for leadership?" and participants marked all teammates that applied. This created a directed network of leadership that captured who sent nominations of leadership and who received nominations of leadership.

2.3.2.4 Team Skills Behaviors

These sociometric items were created for this study. An example item is "(Teammate Name) is effective at using conflict management skills and knowledge." and participants marked all teammates the statement applied too. This created four directed

networks of team skills, capturing who sent nominations of team skills and who received nominations of team skills. These questions were asked at the beginning and end of the project.

2.3.3 Measures to Evaluate Collaboration Readiness

Several measures were used to assess and compare collaboration readiness across training conditions.

2.3.3.1 Motivation Dimension: Pro-Social and Intrinsic Motivation

These 4-item scales were developed by Grant (2008). Participants were asked the question "Why are you motivated to do your work on your team project?" and respond to a series of statements on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree) with how much they agreed with the statement. An example item from the pro-social motivation scale (α=0.92) is "Because I want to help others through my work." and an example item from the intrinsic motivation scale (α=0.96) is "Because I enjoy the work itself." This was asked at the beginning and end of the project.

2.3.3.2 Knowledge of Skills Dimension: Teamwork Metacognition

This dimension is assessed by the knowledge scale previously described as well as the teamwork metacognition scale.

The teamwork metacognition scale was adapted from Schraw and Dennison's (1994) metacognitive awareness scale. This 36-item scale contains seven subscales and participants reported on a 5-point Likert scale (1=Very untrue of me and 5= Very true of me). For this dimension, the knowledge of cognition subscales were used: Declarative knowledge of cognition (α=0.87), procedural knowledge of cognition (α=0.76), and

conditional knowledge of cognition (α=0.77). An example item is "I have control over how well I learn team skills." This was asked at the beginning and end of the team project.

2.3.3.3 Cognitive Strategies Dimension: Teamwork Metacognition

This scale was adapted from Schraw and Dennison's (1994) metacognitive awareness scale. This 36-item scale contains seven subscales and participants reported on a 5-point Likert scale (1=Very untrue of me and 5= Very true of me). For this dimension, the regulation of cognition subscales was used: monitoring (α=0.83), planning (α=0.85), debugging strategies (α=0.73), and evaluation (α=0.89). An example item is "I have control over how well I learn team skills." This was asked at the beginning and end of the team project.

2.3.3.4 Self-Efficacy Dimension: Self-Efficacy for Teamwork

This 10-item scale was adapted from Scholz, Dona, Sud, and Schwarzer (2002; α=0.89). Participants reported on a 5-point Likert scale (1=Very untrue of me and 5= Very true of me). An example item is "I can solve most teamwork problems if I invest the necessary effort." This was asked at the beginning and end of the team project.

2.3.3.5 Enthusiasm for Teaming Dimension: Psychological Collectivism

This 15-item scale was created by Jackson, Colquitt, Wesson, and Zapata-Phelan (2006; α=0.92). Participants responded on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree). An example item is "I preferred to work in those groups than work alone." This was asked at the beginning and end of the team project.

2.3.3.6 Enthusiasm for Teaming Dimension: Enthusiasm for Teaming

This 3-tem scale was adapted from Eddy, Tannenbaum, and Mathieu (2013; α=0.73). Participants respond on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree). An example item for the self-report measure is "Given my experiences with teams, I would prefer to work alone than in a team in the future." This was asked at the beginning and end of the team project.

2.3.4 Manipulation Checks

Participants rated several items on a 5-point Likert scale (1=Strongly Disagree and 5=Strongly Agree) regarding the support from the training facilitators, support from instructor, support from the course, interest in the project, project difficulty, project importance, and required interactions for team members. Additionally, participants estimated the time spent completing different aspects of the project (planning, executing, coordinating, and helping others). This was asked at the end of the team project.

2.4 Procedure

Potential university courses that utilized team projects were identified by myself and a committee member. The courses were evaluated for their project tasks and if a course goal was for students to learn teamwork skills. Courses were assigned to each condition depending on the instructors' experience with previous versions of the training, size of the class, and balancing the representation of different classes in each condition. Once a course was identified, instructors were invited to a meeting to discuss the project goals and what would be required in their class. Training modules were scheduled in each class depending on when teams are assigned, while taking into consideration other homework or tests occurring in the class. During the first week of class, I introduced the training project that

would be administered in that class and obtained consent. The StrengthsFinder assessment was administered at the beginning of the semester because this was not dependent on when the team project began. The first pre-test was administered before training began. Each training module was spaced about a week apart beginning the week teams were assigned. The post-test was administered at the end of the semester.

The point of this training program is to be easily inserted into the classroom with minor disruption to the course. That is why the training program was split up across weeks, rather than administered as intense workshops that take up several classes. Providing instruction this way also allows for training to be delivered at different phases of team development (Morgan et al., 1986). Details for what occurs during each training module have been previously described. Appendix C details problems with implementation in courses due to any anomalies that occurred or deviations from what was planned.

CHAPTER 3. RESULTS

3.1 Manipulation Checks

First, the four training conditions were compared on participants' assessments about the project and about the support received for teamwork. Table 3 displays the means and standard deviations for each condition across the manipulation checks. There were no statistical differences between the groups in terms of how interesting the project was, F (3, 125) = 0.67, p = .55, how important the project was, F (3, 125) = 2.62, p = .06, the perceived support in the course for teamwork, F (3, 125) = 1.20, p = .31, and the perceived support from the team trainers, F (3, 125) = 1.11, p = .35. The groups did differ in perceived project difficulty, F (3, 125) = 17.80, $p < .05$, required interactions, F (3, 124) = 4.47, p = .01, and support from the instructor, F (3, 124) = 4.52, p = .01.

Table 3 ANOVA for training conditions and manipulation checks.

	Control[a]		Leadership[b]		Team Skills[c]		Leadership & Team Skills[d]		*F*	*p*
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		
Project is interesting	3.78	0.93	3.71	0.85	4.00	1.00	3.76	1.05	0.69	.56
Project is difficult	2.81	1.08	2.71	0.89	3.94	0.85	3.96	0.84	17.80	<.01
Project is important	3.74	0.86	3.36	0.95	3.84	0.96	3.28	1.14	2.62	.06
Success requires interaction	4.11	0.69	3.82	0.90	4.46	0.71	4.20	0.71	4.47	.01
Success requires working separately	3.33	1.14	3.46	1.04	3.49	1.21	3.16	1.21	0.51	.68
Instructor provided support	4.04	0.52	4.29	0.82	3.55	1.00	3.89	1.01	4.52	.01
Course provided support	3.81	0.92	4.00	0.90	3.61	0.91	3.68	0.85	1.20	.31
Training administrators provided support	3.52	0.94	3.32	0.77	3.29	1.12	3.68	0.85	1.11	.35

[a]n=27. [b]n=28. [c]n=49 [d]n=25.

A Tukey post-hoc test revealed that participants in the control group reported a statistically significantly lower average for project difficulty ($M = 2.81$) than the team skills only group ($M = 3.93$, $p < .05$) and the full training group ($M = 3.96$, $p < .05$). Similarly, the shared leadership only group ($M = 2.71$) reported a statistically significantly lower average for project difficulty compared to the team skills only ($M = 3.93$, $p < .05$) and full training group ($M = 3.96$, $p < .05$). A Tukey post-hoc test revealed that participants in the shared leadership only group ($M = 3.82$) reported a statistically significantly lower average for required interactions in the team project compared to the team skills only group ($M = 4.46$, $p < .01$). A Tukey post-hoc test revealed that participants in the team skills only group ($M= 3.55$) reported a statistically significantly lower average for perceived instructor support in the team project compared to the leadership only group ($M= 4.29$, $p< .01$). Tables 4 and 5 show the correlations among the significant manipulation checks and collaboration readiness.

Table 4 Correlations between collaboration readiness variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1.Prosocial Motivation													
2.Intrinsic Motivation	.45**												
3. Declarative Knowledge	.37**	.28**											
4. Procedural Knowledge	.35**	.28**	.66**										
5. Conditional Knowledge	.40**	.24**	.75**	.66**									
6. Monitoring	.40**	.32**	.60**	.66**	.68**								
7. Planning	.27**	.18*	.47**	.42**	.53**	.57**							
8. Debugging	.35**	.18*	.52**	.53**	.67**	.53**	.52**						
9. Evaluation	.20*	.19*	.43**	.40**	.51**	.57**	.55**	.41**					
10. Self-Efficacy	.26**	.16	.52**	.47**	.49**	.46**	.58**	.50**	.51**				
11. Psych. Collectivism	.52**	.37**	.44**	.49**	.58**	.52**	.29**	.50**	.35**	.42**			
12. Enthusiasm for Teaming	.18*	.22*	.08	.06	.19*	.08	.09	.17*	.18*	.30**	.53**		
13. Knowledge Teamwork	-.03	.10	.17*	.07	.18*	.06	-.08	.14	-.02	.01	.06	.12	
14. Knowledge Shared Leadership	-.04	-.08	.09	.04	.08	.06	-.23**	-.03	-.17	-.09	.12	.10	.14

Table 5 Correlations between collaboration readiness and manipulation checks.

Variable	Project is Difficult	Success Requires Interaction	Instructor Provided Support
Prosocial Motivation	.18*	.31**	.14
Intrinsic Motivation	.29**	.24**	.19*
Declarative Knowledge of Cognition	.06	.28**	.02
Procedural Knowledge of Cognition	-.04	.18*	.14
Conditional Knowledge of Cognition	.05	.24**	.14
Monitoring	.10	.28**	0
Planning	.09	.25**	.20*
Debugging	.14	.31**	.13
Evaluation	.13	.37**	.05
Self-Efficacy for Teamwork	.04	.47**	.22*
Psychological Collectivism	.17	.33**	.19*
Enthusiasm for Teaming	.19*	.30**	.11
Knowledge of Teamwork	-.03	.09	-.09
Knowledge of Shared Leadership	.23**	.03	-.05
Project is Difficult		.36**	.11
Success Requires Interaction			-.13
Instructor Provided Support			.02

Note: * indicates $p < .05$. ** indicates $p < .01$.

3.2 Individual Differences and Utility Reactions

The goal of measuring individual differences in this study is to capture any relationships with study outcomes that may need to be controlled for or assess differences between conditions for individual differences. Table 6 details correlations between the individual difference measures and study outcomes. Previous group experience, social skills, and the Big 5 inventory were chosen in this study considering individuals may respond to teamwork differently, depending on their experiences and ability to socially interact with others. Several individual differences show relationships with some study outcomes, but only Social Skills showed a relationship with the majority of study outcomes. For that reason, Social Skills is used as a control for hypothesis testing.

Table 6 Correlations between individual differences and study outcomes.

Variable	PGE	Social Skills	Extra-version	Agree-ableness	Conscien-tiousness	Neuro-ticism	Open-ness	Gen	Year	Ethni-city
Prosocial Motivation	.30**	.31**	.10	.15	.14	-.25**	-.03	-.07	-.07	-.06
Intrinsic Motivation	.20*	.20*	.09	.03	.13	-.15	-.09	-.34**	-.19	-.09
Declarative Knowledge	.05	.49**	.08	.20*	.32**	-.16	.08	.10	-.08	0
Procedural Knowledge	.02	.50**	.14	.23*	.22*	-.24**	.09	-.11	-.06	-.04
Conditional Knowledge	.07	.49**	.14	.33**	.21*	-.20*	.11	.01	-.02	.03
Monitoring	.06	.39**	.07	.12	.15	-.14	.09	-.06	-.08	-.09
Planning	.07	.28**	.16	.09	.22*	-.1	-.12	-.06	-.13	-.05
Debugging	.04	.36**	.07	.24**	.26**	-.12	0	-.02	-.03	-.09
Evaluation	-.05	.15	.12	.12	.15	-.01	.01	-.20	0	.15
Self-Efficacy	.04	.38**	.12	.16	.28**	-.22*	.17	-.07	-.14	-.01
Psych. Collectivism	.15	.45**	.19*	.30**	.15	-.26**	.06	-.27*	.01	.05
Enthusiasm for Teaming	.04	.02	.11	.25**	.12	-.16	.06	-.21	.04	0
Knowledge Teamwork	-.13	-.03	-.10	.10	.10	-.17*	.12	.15	-.09	-.18
Knowledge Shared Leadership	-.03	-.06	-.09	.14	-.05	-.01	.15	-.01	-.05	.05

Note. * indicates $p < .05$. ** indicates $p < .01$. PGE=Previous Group Experience. Gen=Gender

To determine whether there were significant differences between individuals in my conditions, I conducted an ANOVA to assess those differences for continuous variables and Chi-Square tests for my categorical variables. Table 7 describes the full results of the ANOVA. The conditions significantly differed for previous group experience, F (3, 126) = 3.46, p = .02, partial η^2 = .08 and conscientiousness, F (3, 125) = 3.10, p = .03, partial η^2 = .07. Post-hoc analyses for previous group experience indicate that the shared leadership condition and team skills condition significantly differed, such that the shared leadership condition had less previous group experience (M = .33) compared to the team-skills condition (M = .52). Post-hoc analyses for conscientiousness indicate that the control

condition and the team skills condition significantly differed, such that the control condition (M = 3.19) was less conscientious than the team skills condition (M = 3.70).

Table 7 Means, standard deviations, and Analysis of Variance comparing individual differences between conditions.

	Control [a]		Shared Leadership[b]		Team Skills[c]		Leadership & Team Skills[d]				
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Previous Group Experience	0.35	0.31	0.33	0.24	0.52	0.34	0.37	0.24	3.46	.02	.08
Social Skills	3.62	0.66	3.81	0.56	3.59	0.71	3.51	0.54	1.07	.36	.03
Extraversion	2.99	0.89	2.94	1.02	2.92	0.75	2.70	0.76	0.61	.61	.01
Agreeableness	3.93	0.63	4.01	0.61	3.72	0.48	3.66	0.66	2.37	.07	.05
Conscientiousness	3.19	0.91	3.47	0.64	3.70	0.68	3.54	0.54	3.10	.03	.07
Neuroticism	2.93	0.68	2.87	0.79	2.65	0.62	3.01	0.70	1.85	.14	.04
Openness	3.75	0.91	3.59	0.84	3.57	0.58	3.69	0.72	0.41	.75	.01

Note. [a]n=27. [b]n=28, 29 for Previous Group Experience. [c]n=49. [d]n=25. Previous Group Experience is on a scale of 0-1, all other variables are 1-5.

Table 8 describes full results for the Chi-Square tests. The conditions significantly differed for year in school, though this should be interpreted with caution considering the wide differences between reported data for each condition. Overall, the sample had few lower classmen (1-2 years of school), with the majority of the sample being upper classmen (3+ years of school). The team skills condition significantly differed by having more 2nd and 3rd year and fewer 4th and 5th+ year students than statistically expected (Field et al., 2012). The full training condition significantly differed by having fewer 3rd year and more 4th year students than statistically expected (Field et al., 2012).

Table 8 Contingency table and Chi-Square test comparing individual differences between conditions.

Variable	Control	Shared Leadership	Team Skills	Leadership & Team Skills	χ^2	*p*
Gender	27	2	43	15	4.69	.19
Female	12	1	9	5		
Male	15	1	34	10		
Year	26	2	43	15	36.52	<.01
1	0	0	3	0		
2	3	0	11 (2.3)	0		
3	6	0	20 (3.3)	0 (-2.8)		
4	9	1	7 (-3.0)	10 (3.2)		
5+	8	1	2 (-3.3)	5		
Ethnicity	27	2	43	15	38.96	.06
Caucasian	12	2	31	8		
Chinese	2	0	2	2		
Vietnamese	0	0	0	2		
Korean	4	0	1	1		
Hispanic/ Latino	0	0	2	2		
African American	4	0	2	0		
Indian	1	0	1	0		
Japanese	0	0	1	0		
Multiple	0	0	3	0		
Other	4	0	0	0		

Note. Numbers in parentheses are the significant adjusted residuals. Due to survey errors, gender, year, and ethnicity was not asked of each participant, which explains the lower n for those variables compared to other study variables.

Utility reactions were measured because they tend to have a strong relationship with learning and transfer of training (Alliger et al., 1997). A repeated-measures ANOVA was used to determine if there were differences in pre- and post-test measures as well as difference between conditions. There was a difference between the means of the pre-test results (M = 3.72) of utility reactions compared to post-test results (M = 3.35), F (1, 117) = 17.74, p < .01, but there was no interaction between time and condition, F (3, 117) =

0.10, p = .96 and post-hoc analyses further confirm no differences between conditions for utility reactions. Table 9 shows descriptive information regarding utility reactions.

Table 9 Descriptive statistics for utility reactions by condition and time.

	Pre-Test		Post-Test		*n*
Condition	*M*	*SD*	*M*	*SD*	
Control	3.83	0.69	3.42	0.77	20
Shared Leadership	3.56	0.77	3.18	0.73	30
Team Skills	3.76	1.02	3.45	1.07	46
Full	3.75	0.68	3.32	0.78	25

3.3 Hypothesis Testing

3.3.1 Evaluating Study Goal 1

Hypothesis 1 was tested with an ANCOVA with training conditions coded as having received shared leadership training or not. Results are displayed in Table 10. There was no difference between individuals that received leadership training and those that did not in shared leadership knowledge, F (1, 118) = 0.96, p = .33. Team membership and course enrollment were covariates in the model. In addition, the previously identified manipulation check ratings that were statistically significant (ratings of project difficulty, if interactions were required for success, level of support provided by the instructor) and social skills were covariates in the model.

Table 10 Descriptive statistics and ANCOVA for the effect of leadership training on leadership knowledge.

Variable	Leadership Training [a]		No Leadership Training [b]				
	M	*SD*	*M*	*SD*	*F*	*p*	η^2
Team	-	-	-	-	0.03	.86	>.01
Course	-	-	-	-	0.35	.56	>.01
Project is difficult	3.30	1.07	3.54	1.08	5.62	.02	.04
Success requires interaction	4.00	0.83	4.33	0.70	0.04	.85	>.01
Instructor provided support	4.09	0.93	3.7	0.89	0.01	.94	>.01
Social Skills	3.67	0.58	3.60	0.69	0.27	.60	>.01
Leadership Knowledge	1.63	0.79	1.49	0.69	0.96	.33	.01

Note. [a]n=27. [b]n=28. Means and standard deviation not reported for nominal variables (Team & Course)

Hypothesis 2 was tested with exponential random graph modeling (ERGM). Using the nodefactor signature in ERGMs, I tested if participating in shared leadership or team skills training predicted the likelihood of shared leadership ties forming. The nodefactor term predicts the number of ties based on a categorical variable, in this case if the participant received training or not. Since these are directed networks, it considers both outgoing and incoming ties, thus it captures both nominations of one's teammates as leaders as well as nominations from others to a person as a leader. It does not consider self-nominations as those do not produce ties.

Participating in shared leadership training predicted shared leadership ties forming with an effect estimate of 0.34 ($p < .05$) but participating in the team skills training did not. Individuals who received shared leadership training nominated others as leaders and were nominated as leaders more often than those who did not receive shared leadership training. This supports Hypothesis 2, as those who received shared leadership training were more

likely to exhibit shared leadership than those who did not. The odds ratio of the predictor can give an interpretable parameter to tell us the likelihood of a tie forming given the predictor. The odds ratio of the shared leadership condition is 1.4, meaning those in the shared leadership training condition were 1.4 times more likely to develop a shared leadership tie than those who were not. Table 11 shows the full results of the ERGM model.

Table 11 ERGM results of leadership or teamwork training predicting shared leadership.

Parameter	Effect Estimate	Standard Error	*p*	Odds Ratio
Shared Leadership Network				
Edges	-0.24	0.26	.36	
Leadership Skills (nodefactor)*	0.34	0.14	.02	1.41
Teamwork Training (nodefactor)	-0.20	0.14	.15	0.82

Note.78 individuals, 22 teams, 89 dyadic connections. * denotes $p<.05$. Data was collected at the team level creating networks for each team. To create one matrix for this analysis, a mega-matrix was used. The sociometric item used for this network analysis was: "Who does your team rely on for leadership." Teams that experienced shared leadership training were considered as having leadership skills training (including the shared leadership condition and full training condition). Teams that did not experience shared leadership training were considered as not having leadership skills training (team skills only condition and control condition). Teams that experienced teamwork skills training were considered as having teamwork training (including the team skills only condition and full training condition). Teams that did not experience teamwork skills training were considered as not having teamwork training (shared leadership condition and control condition).

To further explore the network differences, density and centralization were calculated for each team and averaged for each condition (Table 12 displays this information). Density explains the proportion of potential ties in a network compared to actual ties. For shared leadership, it is expected to see denser networks to represent more leadership ties existing within the network. The centralization measure compares the observed network to a star network of the same size because a star network is considered

the most centralized network shape (Hanneman & Riddle, 2005). This produces a proportion of the observed network compared to a star network. Considering my networks are directed, it's important to examine both in-degree and out-degree centralization. In-degree refers to ties sent to a node and out-degree refers to ties sent from a node. High centralization would indicate similarity to the most star-like shape in the network, thus high centrality, where individuals are sending ties to only one person in the network, and everyone is sending at least one tie out to that popular person.

Table 12 Shared leadership network density & centralization by team and condition.

Teams	# in team	# of Leaders Nominated Once	# of Leaders Nominated Twice or More	Density	In-Degree Centralization	Out-Degree Centralization
Shared Leadership Training						
Team 4	3	2	1	.67	.50	.50
Team 18	4	0	4	.83	.22	.22
Team 19	4	2	2	.67	.44	.44
Team 20	4	2	1	.42	.78	.78
Team 21	3	2	0	.33	.25	.25
Team 22	4	0	4	.75	.33	.33
Team Skills Training						
Team 10	3	2	1	.67	.50	.50
Team 11	3	1	2	.50	.75	.75
Team 12	3	2	0	.33	1	.25
Team 13	3	1	1	.50	0	.75
Team 14	4	0	1	.17	.22	.67
Team 15	4	1	1	.33	0	.89
Full Training						
Team 1	3	0	0	0	0	0
Team 2	3	0	2	.67	.50	.50
Team 3	5	0	5	.65	.44	.44
Team 16	4	1	2	.58	.56	.56
Team 17	4	1	1	.25	.56	.56
Control Training						
Team 5	3	1	0	.17	.50	.50
Team 6	4	1	1	.33	0	.89
Team 7	3	0	3	1	0	0
Team 8	4	0	1	.25	.11	1
Team 9	3	1	1	.50	0	.75

Note. Density and centralization are on a scale of 0-1. Team 1 appears an anomaly, but this team only had one person self-nominate themselves as a leader.

For those teams that received shared leadership training (shared leadership and full conditions), there is a pattern of results that indicates these teams had less out-degree centralization but were generally equal in in-degree centralization compared to those who did not receive shared leadership training. While this would give support to Hypothesis 2 that shared leadership training would increase leadership and followership, Kruskal-Wallis tests did not indicate any significant differences between conditions, thus interpretation of the differences between conditions based on these network properties should be done cautiously. Table 13 has the full results for differences between conditions for network density, in-degree centralization, and out-degree centralization.

Table 13 Kruskal-Wallis analysis of differences between conditions for density & centralization.

Variable	Control		Shared Leadership		Team Skills		Leadership & Team Skills		χ^2	*p*
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		
Density	.43	.26	.61	.18	.42	.16	.46	.22	3.78	.28
In-Degree Centralization	.12	.19	.42	.19	.42	.38	.41	.21	3.83	.27
Out-Degree Centralization	.63	.36	.42	.19	.64	.21	.41	.21	3.34	.34

In addition to the additional network property comparisons, Table 12 also provides information about how many leaders were nominated and how often, broken down by the number of leaders nominated by one other person and the number nominated by two or more other individuals. T-test results indicate there was a difference between the number of people nominated as a leader, such that those who experienced leadership training

(shared leadership and full training) nominated more leaders (M = 2.00, SD = 1.67) when nominated by two or more individuals) than those who did not experience training (M = 1.09, SD = 0.83), t (20) = 1.61, p = .05. Table 14 shows the full results of the t-tests.

Table 14 Descriptive statistics and t-test analysis for leadership nominations by condition.

	Received Leadership Training		Did Not Receive Leadership Training					
Variable	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*	*Cohen's d*
Nominated by 1 Other	0.91	0.94	0.91	0.70	20	0	.08	0
Nominated by 2 or More Others	2.00	1.67	1.09	0.83	20	1.61	<.05	.69

Hypothesis 3 was tested with an ANCOVA with training conditions coded as having received team skills training or not. Results are displayed in Table 15. There was no difference in team skills knowledge between individuals that received team skills training and those who did not, F (1, 118) = 1.57, p = .21. Team membership, course enrollment, the previously identified manipulation check ratings that were statistically significant (ratings of project difficulty, if interactions were required for success, level of support provided by the instructor) and social skills were covariates in the model.

Table 15 Descriptive statistics and ANCOVA for the effects of team skills training on teamwork knowledge.

	Team Skills Training [a]		No Team Skills Training [b]				
Variable	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Team	-	-	-	-	0.24	.63	>.01
Course	-	-	-	-	0.53	.47	>.01
Project is difficult	3.95	0.84	2.76	0.98	1.29	.26	.01
Success requires interaction	4.37	0.69	3.96	0.82	0.82	.37	.01
Instructor provided support	3.66	1.01	4.17	0.69	0.56	.45	.01
Social Skills	3.57	0.65	3.71	0.61	0.50	.82	>.01
Teamwork Knowledge	4.35	1.05	4.15	0.89	1.57	.21	.01

Note. [a]n=74. [b]n=55. Means and standard deviation not reported for nominal variables (Team & Course)

Hypothesis 4 was tested with exponential random graph modeling (ERGM) with different teamwork behavior networks. Results are displayed in Table 16. Using the node factor signature in ERGMs, I tested if participating in team skills or shared leadership training predicted the likelihood of teamwork ties forming. For each of the networks (leveraging differences, coordination, and conflict management), participating in training did not predict ratings of engaging in teamwork behaviors. There was no support for Hypothesis 4.

Table 16 ERGM results of leadership or teamwork training predicting endorsement of teamwork behaviors.

Parameter	Effect Estimate	Standard Error	*p*	Odds Ratio
Conflict Management Skill Endorsement Network (t=21, n=73, l=117)				
Edge*	0.55	0.27	.04	
Leadership Skills (nodefactor)	0.04	0.15	.29	1.04
Teamwork Training (nodefactor)	-0.09	0.15	-.59	0.91
Coordination Skill Endorsement Network (t=22, n=77, l=138)				
Edge**	0.96	0.29	<.001	
Leadership Skills (nodefactor)	0.02	0.16	.93	1.02
Teamwork Training (nodefactor)	-0.10	0.16	.51	0.91
Leveraging Differences Skill Endorsement Network (t=22, n=78, l=128)				
Edge**	0.94	0.28	<.001	
Leadership Skills (nodefactor)	-0.21	0.15	.17	0.81
Teamwork Training (nodefactor)	-0.08	0.15	.59	0.92
Enthusiasm for Teaming Endorsement Network (t=21, n=73, l=162)				
Edge**	2.07	0.39	<.001	
Leadership Skills (nodefactor)	0.09	0.21	.69	1.09
Teamwork Training (nodefactor)	-0.17	0.21	.42	0.84

Note. t=number of teams, n=number of individuals, l=number of dyadic connections; * denotes $p<.05$; ** denotes $p<.01$

3.3.2 Evaluating Study Goal 2

Hypotheses 5-7 were tested using 2-way Multivariate Analyses of Covariances (MANCOVA) for four of the dimensions of collaboration readiness and one 2-way Analysis of Variance (ANOVA; self-efficacy only has one dependent variable measure). As with the previous hypotheses, the two dimensions were "received team training or not" and "received shared leadership training or not". The previously identified covariates were included in the models. Hypothesis 5 predicted those who received team training were more highly rated in collaboration readiness than those who did not. Hypothesis 6 predicted those who received shared leadership training were more highly rated in collaboration readiness than those who did not, and Hypothesis 7 predicted an interaction effect of receiving team and shared leadership training.

For the motivation dimension of collaboration readiness, there was no statistically significant effect of team training on the combined dependent variables, F (2, 115) = 0.93, p = .39, Wilks' λ = .98, partial η^2 = .01. Nor was there a statistically significant difference of shared leadership training on the combined dependent variables, F (2, 115) = 0.15, p = .87, Wilks' λ = .99, partial η^2 < .01. There was a statistically significant interaction between the shared leadership and team training variables on the combined dependent variables, F (2, 115) = 4.06, p = .02, Wilks' λ = .93, partial η^2=.06. Tests of between-subjects effect show an interaction effect for intrinsic motivation, F (1, 116) = 7.99, p = .01, partial η^2 = .06, but not prosocial motivation, F (1, 116) =1.83, p = .18. Figure 1 shows the interaction effect for intrinsic motivation. Even though an interaction effect existed, the direction was not in the hypothesized direction (that the full training would show the most motivation). Thus, for the motivation dimension, there was no support for Hypotheses 5, 6 or 7. Tables

17-18 show the means, standard deviations, and significance tests for the collaboration readiness variables by training group.

Table 17 Descriptive statistics of motivation dimension of collaboration readiness by condition.

Variable	Intrinsic Motivation *M*	Intrinsic Motivation *SD*	Prosocial Motivation *M*	Prosocial Motivation *SD*	*n*
Team Skill Training					
Received	3.55	1.09	3.77	0.91	72
Did Not Receive	3.25	0.93	3.53	0.76	54
Leadership Skill Training					
Received	3.29	1.06	3.54	0.96	51
Did Not Receive	3.52	1.01	3.76	0.77	75

Table 18 MANCOVA summary of motivation dimension of collaboration readiness.

Training Type & Variable	MANCOVA Wilks' λ	MANCOVA *F*	MANCOVA *df*	MANCOVA *p*	MANCOVA partial η^2	Between Subjects Effects *F*	Between Subjects Effects *df*	Between Subjects Effects *p*	Between Subjects Effects partial η^2
Shared Leadership Only	.99	0.15	2,115	.87	<.01				
Intrinsic Motivation						0.87	1,116	.67	<.01
Prosocial Motivation						0.20	1,116	.66	<.01
Team Skills Only	.98	0.93	2,115	.39	.01				
Intrinsic Motivation						0.95	1,116	.33	.01
Prosocial Motivation						1.52	1,116	.22	.01
Shared Leadership & Team Skills	.93	4.06	2,115	.02	.06				
Intrinsic Motivation						7.99	1,116	.01	.06
Prosocial Motivation						1.83	1,116	.18	.02

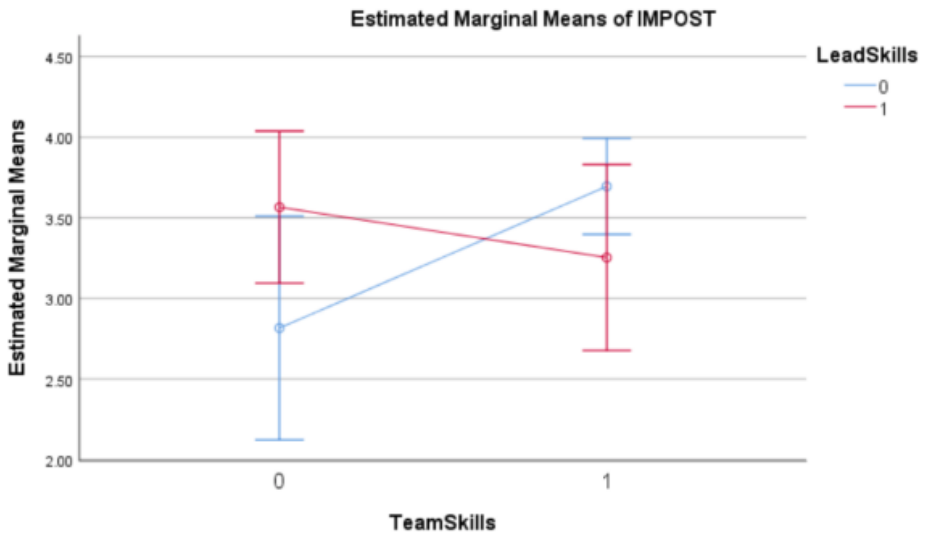


Figure 1- This graph shows the interaction between shared leadership training and team skills training with intrinsic motivation (post-test) as the outcome. The 0 means no training and the 1 means training.

For the knowledge of skills dimension of collaboration readiness, there was no statistically significant difference of team training on the combined dependent variables, F (5, 111) = 1.16, p = .33, Wilks' λ = .95, partial η^2 =.05. Nor was there a statistically significant difference of shared leadership training on the combined dependent variables, F (5, 111) = 0.58, p = .71, Wilks' λ = .97, partial η^2 = .03. There was no statistically significant interaction between the shared leadership and team training variables on the combined dependent variables, F (5, 111) = 1.67, p = .15, Wilks' λ = .93, partial η^2 = .07. Thus, for the knowledge of skills dimension, there was no support for Hypothesis 5, 6 or 7. Tables 19-20 show the means and standard deviations and significance tests for the collaboration readiness variables by training group.

Table 19 Descriptive statistics of knowledge of skills dimension of collaboration readiness by condition.

Variable	Declarative Knowledge of Cognition *M*	*SD*	Procedural Knowledge of Cognition *M*	*SD*	Conditional Knowledge of Cognition *M*	*SD*	*n*
Team Skill Training							
Received	3.91	0.72	3.80	0.71	3.84	0.73	72
Did Not Receive	3.73	0.55	3.68	0.57	3.68	0.51	53
Leadership Skill Training							
Received	3.81	0.59	3.71	0.58	3.79	0.55	51
Did Not Receive	3.85	0.69	3.78	0.70	3.76	0.71	74

Table 20 MANCOVA summary of knowledge of skills dimension of collaboration readiness.

		MANCOVA			
Training Type	Wilks' λ	*F*	*df*	*p*	partial η^2
Shared Leadership Only	.97	0.58	5,111	.71	.03
Team Skills Only	.95	1.16	5,111	.33	.05
Shared Leadership & Team Skills	.93	1.67	5,111	.15	.07

For the cognitive strategies dimension of collaboration readiness, there was a statistically significant difference of team training on the combined dependent variables, F (4, 113) = 2.64, p = .04, Wilks' λ = .92, partial η^2 = .09. The test of between-subjects effects shows a main effect of team skills training for monitoring metacognition, F (1, 116) = 6.74, p = .01, partial η^2 = .06, but not the other cognitive strategies. There was not a statistically significant difference of shared leadership training on the combined dependent variables, F (4, 113) = 1.09, p = .36, Wilks' λ = .96, partial η^2 = .04. Nor was there a statistically

significant interaction between the shared leadership and team training variables on the combined dependent variables, F (4, 113) = 0.67, p = .61, Wilks' λ = .98, partial η^2 = .02. Thus, for the cognitive strategies dimension, there was support for Hypothesis 5 but no support for Hypothesis 6 or 7. Tables 21-22 show the means, standard deviations, and significance tests for the collaboration readiness variables by training group.

Table 21 Descriptive statistics of cognitive strategies dimension of collaboration readiness by condition.

	Monitoring		Planning		Debugging Strategies		Evaluation		*n*
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	
Team Skill Training									
Received	3.64	0.72	3.51	0.84	3.94	0.58	3.78	0.76	73
Did Not Receive	3.31	0.57	3.32	0.73	3.78	0.51	3.60	0.62	53
Leadership Skill Training									
Received	3.53	0.62	3.40	0.66	3.83	0.47	3.69	0.64	74
Did Not Receive	3.49	0.72	3.45	0.89	3.90	0.61	3.70	0.76	52

Table 22 MANCOVA summary of cognitive strategies dimension of collaboration readiness.

Training Type & Variable	MANCOVA Wilks' λ	*F*	*df*	*p*	partial η^2	Between Subjects Effects *F*	*df*	*p*	partial η^2
Shared Leadership Only	.96	1.09	4,113	.36	.04				
Monitoring						1.98	1,116	.16	.02
Planning						0.28	1,116	.59	<.01
Debugging						0.27	1,116	.60	<.01
Evaluation						0.06	1,116	.81	<.01
Team Skills Only	.92	2.64	4,113	.04	.09				
Monitoring						6.74	1,116	.01	.06
Planning						0.65	1,116	.42	.01
Debugging						0.05	1,116	.82	<.01
Evaluation						0.12	1,116	.75	<.01
Shared Leadership & Team Skills	.98	0.67	4,113	.61	.02				
Monitoring						0.30	1,116	.86	<.01
Planning						2.27	1,116	.14	.02
Debugging						0.29	1,116	.59	<.01
Evaluation						0.14	1,116	.71	<.01

For the self-efficacy dimension of collaboration readiness, a two-way ANOVA was conducted that examined the impact of team training and shared leadership training on teamwork self-efficacy. There were no significant main effects of team training, F (1, 117) = 3.17, p = .08, shared leadership training, F (1, 117) = 0.01, p = .94, or an interaction between the two, F (1, 117) < .01, p = .98. Thus, for the self-efficacy dimension, there was no support for Hypothesis 5, 6 or 7. Tables 23-24 show the means and standard deviations and significance tests for the collaboration readiness variables by training group.

Table 23 Descriptive statistics of self-efficacy dimension of collaboration readiness by condition.

	Generalized Self-Efficacy for Teamwork		
Variable	*M*	*SD*	*n*
Team Skill Training			
Received	3.96	0.53	73
Did Not Receive	3.79	0.54	54
Leadership Skill Training			
Received	3.86	0.57	75
Did Not Receive	3.91	0.53	52

Table 24 ANOVA of self-efficacy dimension of collaboration readiness.

Variable	*df*	*MS*	*F*	*p*
Team Skill Training	1	0.59	3.17	.08
Leadership Skill Training	1	<.01	.01	.94
Team Skill x Leadership	1	<.01	<.01	.98
Error	117	0.19		

For the enthusiasm for teaming dimension of collaboration readiness, there was no statistically significant difference of team training on the combined dependent variables, F (2, 116) = 1.17, p = .32, Wilks' λ = .98, partial η^2 = .02. Nor was there a statistically significant difference of shared leadership training on the combined dependent variables, F (2, 116) = 0.47, p = .63, Wilks' λ = .99, partial η^2=.01. There was no statistically significant interaction between the shared leadership and team training variables on the combined dependent variables, F (2, 116) = 0.56, p = .57, Wilks' λ = .99, partial η^2 = .01. Thus, for the enthusiasm for teaming dimension, there was no support for Hypothesis 5, 6 or 7. Tables 25-26 show the means and standard deviations and significance tests for the collaboration readiness variables by training group.

Table 25 Descriptive statistics of enthusiasm for teaming dimension of collaboration readiness by condition.

Variable	Psychological Collectivism		Enthusiasm for Teaming		*n*
	M	*SD*	*M*	*SD*	
Team Skill Training					
Received	3.70	0.65	3.33	0.82	73
Did Not Receive	3.53	0.61	3.24	0.92	54
Leadership Skill Training					
Received	3.61	0.64	3.38	0.77	75
Did Not Receive	3.64	0.63	3.23	0.92	52

Table 26 MANCOVA summary of enthusiasm for teaming dimension of collaboration readiness.

		MANCOVA			
Training Type	Wilks' λ	*F*	*df*	*p*	partial η^2
Shared Leadership Only	.99	0.47	2,116	.63	.01
Team Skills Only	.98	1.17	2,116	.32	.02
Shared Leadership & Team Skills	.99	0.56	2,116	.57	.01

Beyond comparing across the training conditions, it is important to see if participants had a change in collaboration readiness across time. That is, do participants have a difference between pre-training scores and post-training scores. Results are displayed in Table 27. In summary, for most of the dimensions there were no differences between pre- and post-test results. Participants' ratings of prosocial motivation showed decreases at the end of the training whereas knowledge of shared leadership showed an increase at the end of the training.

Table 27 Descriptive statistics and paired samples t-test for study variables.

	Pre-Test		Post-Test					
Variable	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*	*Cohen's d*
Prosocial Motivation	4.01	0.62	3.66	0.83	119	5.56	<.01	.41
Intrinsic Motivation	3.56	0.84	3.40	1.03	119	1.92	.06	.16
Declarative Knowledge	3.89	0.49	3.88	0.54	115	0.19	.85	.02
Procedural Knowledge	3.79	0.59	3.76	0.60	115	0.53	.59	.05
Conditional Knowledge	3.76	0.49	3.79	0.53	114	-0.56	.58	.06
Monitoring	3.41	0.67	3.49	0.65	114	-1.17	.24	.11
Planning	3.32	0.74	3.45	0.76	115	-1.81	.07	.16
Debugging	3.77	0.56	3.89	0.53	114	-1.97	.05	.22
Evaluation	3.68	0.69	3.67	0.67	115	0.25	.81	.02
Self-Efficacy for Teamwork	3.89	0.59	3.88	0.52	113	0.13	.89	.01
Psychological Collectivism	3.59	0.54	3.62	0.57	109	-0.78	.44	.07
Enthusiasm for Teaming	3.37	0.87	3.28	0.84	109	1.09	.28	.11
Knowledge of Teamwork [a]	4.12	1.08	4.33	0.99	110	-1.76	.08	.21
Knowledge of Shared Leadership [b]	1.16	0.69	1.55	0.72	109	-5.07	<.01	.54

Note. Maximum value is 5 unless otherwise stated. [a] max value is 6. [b] max value is 3.

3.4 Attrition and Non-Response Analysis

A series of analyses were conducted to determine if there were any differences between conditions, classes, or semesters of data collection that might explain the lack of responses to surveys. One course was removed because the majority of that course did not participate in training and only those participants who arrived at training were considered a complete sample, leaving only one team.

The first set of analyses compared those who completed both the pre-test and post-test to those who only completed the pre-test surveys. There were no statistical differences in pre-test responses between any of the collaboration readiness measures or utility reactions for the two groups. Individual difference measures were only captured in the post-test, so this could not be tested between groups. Table 28 details the results of the t-tests.

Table 28 Comparison of completion of pre-test & post-test versus pre-test only.

Variable	Completed Pre-Test[a]		Completed Pre-Test & Post-Test[b]				
	M	*SD*	*M*	*SD*	*df*	*t*	*p*
Utility Reactions	3.63	0.82	3.71	0.70	171	-0.63	.53
Prosocial Motivation	3.98	0.75	4.00	0.61	171	-0.19	.85
Intrinsic Motivation	3.68	0.79	3.54	0.84	171	1.04	.30
Declarative Knowledge	3.94	0.50	3.88	0.48	167	0.76	.45
Procedural Knowledge	3.68	0.61	3.78	0.57	167	-0.98	.33
Conditional Knowledge	3.75	0.61	3.78	0.47	164	-0.34	.74
Monitoring	3.44	0.62	3.41	0.66	166	0.23	.82
Planning	3.36	0.66	3.33	0.72	167	0.23	.82
Debugging	3.71	0.52	3.77	0.55	166	-0.69	.49
Evaluation	3.67	0.58	3.69	0.69	167	-0.24	.81
Self-Efficacy for Teamwork	3.89	0.50	3.88	0.59	165	0.18	.86
Psychological Collectivism	3.63	0.52	3.59	0.53	163	0.43	.67
Enthusiasm for Teaming	3.28	0.79	3.33	0.87	163	-0.34	.73
Knowledge of Teamwork	4.02	1.12	4.05	1.11	164	-0.16	.88
Knowledge of Shared Leadership	1.29	0.77	1.16	0.68	163	1.06	.29

Note. [a]n=47-50, [b]n=117-120

Differences were examined based on course, instructor, semester, and condition. There were no differences between the pre-test only group and the pre-test and post-test group based on course, χ^2 (5, N = 175) = 7.99, p = .16, instructor, χ^2 (5, N = 175) = 7.99, p = .16, semester, χ^2 (1, N = 175) = 0.11, p = .73, or condition, χ^2 (3, N = 175) = 3.59, p = .31. Given these results, it can be concluded that attrition was not related to differences in study outcomes, the courses, instructors, semester, or training condition. Attrition is common between pre-test and post-test surveys.

The second set of analyses compared differences between individuals whose data were retained for team-level analyses and those who were not. Only teams that had complete network data were retained for the team-level analyses. Team-level analyses were done with post-test data, so all post-test survey items could be compared. There was a

statistically significant difference between those who were retained for the team analysis and those who were not in extraversion and two manipulation check items. Those who were more extraverted were more likely to be retained for team-level analysis, t (125) = 2.38, p = .02. Additionally, those who perceived higher course support for the team project, t (125) = -2.89, p = .01, instructor support for the team project, t (125) = -2.18, p = .03, and support from the training administrators, t (125) = -2.24, p = .03, were more likely to be retained for team-level analysis. These three taken together suggest that there may have been extra influence on these teams that encouraged all members to complete the survey. Outgoing members could be encouraging, especially when they felt that the course, instructor, and trainers were supporting their team project. Table 29 has the full results.

Table 29 Comparison of individuals retained for team analysis versus not retained.

Variable	Not Retained for Team Analysis[a]		Retained for Team Analysis[b]				
	M	*SD*	*M*	*SD*	*df*	*t*	*p*
Utility Reactions	3.21	0.95	3.43	0.81	137	-1.46	.15
Prosocial Motivation	3.76	0.79	3.55	0.89	135	1.43	.15
Intrinsic Motivation	3.34	0.98	3.45	1.06	135	-0.61	.54
Declarative Knowledge	3.83	0.64	3.84	0.68	132	-0.09	.93
Procedural Knowledge	3.69	0.69	3.81	0.62	132	-1.04	.29
Conditional Knowledge	3.74	0.63	3.80	0.67	131	-0.60	.55
Monitoring	3.45	0.68	3.51	0.69	131	-0.76	.45
Planning	3.41	0.82	3.44	0.80	132	-0.20	.84
Debugging	3.86	0.56	3.88	0.56	132	-0.19	.85
Evaluation	3.71	0.67	3.71	0.74	132	0	1
Self-Efficacy for Teamwork	3.89	0.50	3.88	0.58	130	0.23	.82
Psychological Collectivism	3.59	0.64	3.65	0.61	127	-0.57	.57
Enthusiasm for Teaming	3.27	0.88	3.29	0.85	127	-0.13	.89
Knowledge of Teamwork	4.25	1.09	4.31	0.91	127	-0.37	.71
Knowledge of Shared Leadership	1.59	0.71	1.55	0.76	127	0.31	.75
Previous Group Experience	.43	.29	.41	.32	126	0.49	.62
Social Skills	3.54	0.75	3.69	0.53	125	-1.33	.19
Extraversion	2.69	0.79	3.05	0.85	125	-2.38	.02
Agreeableness	3.78	0.56	3.85	0.62	125	-0.69	.49
Conscientiousness	3.64	0.69	3.42	0.73	125	1.72	.09
Neuroticism	2.71	0.59	2.93	0.76	125	-1.72	.09
Openness	3.62	0.67	3.64	0.79	125	-0.15	.88
Project is interesting	3.67	1.00	3.94	0.92	125	-1.59	.11
Project is difficult	3.51	1.05	3.36	1.09	125	0.77	.44
Project is important	3.69	1.03	3.50	0.95	125	1.08	.28
Success requires interaction	4.15	0.86	4.22	0.72	124	-0.53	.59
Success requires working separately	3.33	1.07	3.40	1.22	125	-0.36	.72
Instructor provided support	3.67	0.96	4.03	0.86	124	-2.18	.03
Course provided support	3.49	0.99	3.94	0.77	125	-2.89	.01
Training administrators provided support	3.22	1.04	3.58	0.88	125	-2.24	.03

Note. [a]n=47-50, [b]n=117-120

Differences were examined based on course, instructor, semester, condition, gender, year, and ethnicity. There were no differences between individuals retained for team-level analyses and those that were not based on semester, χ^2 (1, N = 139) = 0.15, p = .69, gender, χ^2 (1, N = 85) = 1.21, p = .27, year in school, χ^2 (4, N = 84) = 5.46, p = .24, or ethnicity, χ^2 (9, N = 85) = 15.52, p = .08. There was a difference based on condition, χ^2 (3, N = 139) = 11.86, p < .01. The adjusted residuals for the chi-square analysis based on condition suggest that the team skills only condition is deviant, and there are fewer teams retained from analysis than would be expected. For this analysis, the team skills condition represented about 40% of the data and it is possible the larger sample size compared to the other conditions is also driving this finding.

There was also a difference based on instructor, χ^2 (5, N = 139) = 33.27, p < .01, and course, χ^2 (5, N = 139) = 33.27, p < .01. The data for this analysis had one instructor per course, so these significant results are based on the same differences. Considering there were differences for instructor and course, as well as differences for the manipulation checks regarding course and instructor support for the team project, further analyses were done to compare the instructors based on the manipulation check questions. While some courses had more participants represented in the final sample than others, the majority of manipulation checks were significant based on course. There was a difference in perception of project difficulty, F (5, 121) = 15.59, p <.01, project importance, F (5, 121) = 2.38, p = .04, success requiring a high level of interaction, F (5, 120) = 2.57, p = .03, project requiring sequential working, F (5, 121) = 2.91, p = .02, instructor provided support, F (5, 120) = 3.57, p = .01, course provided support, F (5, 121) = 3.71, p < .01, and support from team trainers, F (5, 121) = 2.83, p = .02, based on the course.

Post-hoc analyses indicate project difficulty was lower for the PSYC 2015 (*M* = 2.58) course compared to the ME 4182 (*M* = 4.30), CHBE 4520/4530 (*M* = 3.73), and ME 2110 (*M* = 4.02) courses; success requiring high levels of interaction was lower for the PSYC 2015 (*M* = 3.38) course compared to the ME 2110 course (*M* = 3.88); project requiring sequential work was lower for ME 4182 (*M* = 2.20) compared to PSYC 2015 (*M* = 3.38), ME 2110 (*M* = 3.53) and CHBE 4520/4530 (*M* = 3.80); instructor provided support was higher for PSYC 2015 (*M* = 4.27) compared to ME 2110 (*M* = 3.58); course provided support was higher for PSYC 2015 (*M* = 4.04) compared to MSE 4420 (*M* = 2.83); and training administrators provided support was lower for MSE 4420 (*M* = 2.17) compared to PSYC 2015 (*M* = 3.42), ME 2110 (*M* = 3.44), and CHBE 4520/4530 (*M* = 3.87).

It is difficult to say if the differences are because of the instructors themselves or the course since this analysis did not include different instructors for the same course. Some courses/instructors are seen as more supportive, which provides further evidence that the differences between individuals retained for team analyses and those that were not may be influenced by the course setting.

While only a few manipulation checks had a significant relationship with the hypothesized study outcomes, it is clear there are underlying differences between the courses in this study that could be biasing the results of the current study. In this analysis, only one course is represented across different conditions: PSYC 2015. ME 4182 is also represented across conditions, but that is the one course section that was removed from these missing data analyses. The consistent finding of differences between PSYC 2015 and other courses could be creating noise in the data and results and may explain some null findings.

CHAPTER 4: DISCUSSION

This study set out to expand the understanding of shared leadership training and develop a common understanding of collaboration readiness for individuals. Overall, the training had some positive impacts for shared leadership and collaboration readiness but lacked support for many hypothesized relationships. The patterns of results provide insight into future directions for training future employees in key skills.

4.1 Shared Leadership and Team Training

This study helps to address a current gap in leadership development research by creating a program to train shared leadership (Cullen-Lester et al., 2017; Eva et al., 2019; Lacerenza et al., 2018). In addition to more traditional methods of assessing training, such as knowledge tests, social network analysis was used to compare the leadership networks across different training types. While there was no difference in knowledge gain between those who a received shared leadership training and those who did not, there was a small network difference. The ERGM model predicts the likelihood of ties forming, i.e., the likelihood of individuals nominating others as leaders within their team. Those who received shared leadership training were likely to nominate others as leaders, but this effect did not exist for those who did not receive shared leadership training. That should not be interpreted as those not receiving shared leadership training have more hierarchical leadership. Rather, a lack of shared leadership training has no impact on the leadership network. The ERGM effect was small and should be interpreted with caution but is nonetheless an interesting finding.

Further analysis of the networks shows an interesting pattern of results. Individuals who experience shared leadership training only have dense networks (over half of the potential ties in the network exist), while those who had the full training had less dense networks than those with only the shared leadership training. Centralization indicates the proportion of an observed network's centrality compared to a network of maximum centrality (a star shaped network). The higher the centralization score, the more similar it is to a star shaped network. Teams that exhibit shared leadership should not have a highly centralized network, but shared leadership can look different across teams. If two individuals are equally nominated as leaders, this is shared leadership, just as if a team nominated all members of the team as leaders. These two examples have very different network shapes.

My networks were directed, thus, I have in-degree and out-degree centralization scores for each team. The general interpretation is the same, for in-degree centralization, do my incoming ties resemble a maximal central network or not, and for my out-degree centralization do my outgoing ties resemble a maximal central network or not. Taking this approach, the maximally central in-degree network would show one person receiving ties from all possible individuals in the network, thus this may be a rough metric for leadership. The maximally central out-degree network would show all (but one) individuals in the network sending one tie out, and this may be a rough metric for followership. While a high centralization score suggests a lack of shared leadership considering a star-shape does not show shared leadership, a low centralization score does not necessarily indicate that shared leadership exists, at least for this study. Team sizes ranged from 3-5 for this analysis and

there is little potential variation in network structures. The centralization results should be interpreted cautiously because this metric is sensitive to small group sizes.

The network analysis indicates a behavioral difference for shared leadership training, but generally had no impact on collaboration readiness. This can be interpreted in several ways. First, perhaps there was a problem with measurement. The measures used showed acceptable reliability and the majority have been used previously in research, so the problem is not likely with the measures themselves but rather the appropriateness of the ones used. The second is a problem with the training, which can be broken down in two ways. Considering the general lack of findings and no difference in scores before and after training, there is a possibility that a different design could lead to different results for shared leadership training. Alternatively, the way in which shared leadership was taught may not have aligned with the individual focus of collaboration readiness. Cullen-Lester and her colleagues (2017) break down shared leadership training in three ways: improving an individual's social awareness, improving an individual's capacity to leverage their own and other networks, and improving a collective's capacity to understand and leverage their own network. The current study's shared leadership training taught the team how to better understand and leverage their network rather than focusing specifically on an individual. This may be why this study shows a behavioral change at the collective level, but not at the individual level.

In addition to advancing research on shared leadership training, this study also provides a fresh perspective on understanding the impacts of training. Shared leadership is relational, thus using network analysis is appropriate for this research but is not commonly found in training research. As science progresses, researchers find themselves answering

old questions in new ways, such as utilizing network analysis as a method for understanding training impact. This study provides some evidence to support using diverse analytical methods to understand how training impacts relations.

Differences in individuals' collaboration readiness between those who received team skills training and those who did not had mixed results. There were no knowledge, attitudinal, or behavioral differences between the training groups. Despite this, those who received team skills training showed an increased awareness of cognitive strategies related to teamwork. While not all cognitive strategies were impacted, trainees' metacognition of monitoring was meaningfully significant (Cohen, 1988; Richardson, 2011), showing an increase in the team skills training condition. Metacognitive monitoring is when a trainee is cognizant of their behaviors as a teammate and should not be confused with performance monitoring (which the metacognitive evaluation concept was measuring in this study). Training teamwork skills enhanced individuals' conscious thoughts and efforts regarding the teamwork strategies they were using.

The final relationship found in this study showed an impact on motivation, more specifically intrinsic motivation, but not prosocial motivation. The interaction between team skills and leadership training was meaningfully significant (Cohen, 1988; Richardson, 2011), showing an interesting relationship between the two as seen in Figure 1. While receiving any type of training was more motivating than not receiving any, the combined shared leadership and team skills training was less motivating than the two as separate trainings. Thus, in the full training, trainees were not as intrinsically motivated to work towards their team project as they were in the conditions that had only shared leadership or only team skills training.

Considering the content of the combined training is not different than the component training, the decrease in motivation could be due to the increased time spent on training. Motivation is key for transfer of training and it is important to know when a training may be demotivating (Burke & Hutchins, 2007). It is possible the trainees were overloaded by the combined training, which may explain some of the lack of findings within this study. Thus, this study provides a useful benchmark to understand when a training program has become too demanding.

Previous research has established that team skills training improves knowledge and collaboration behaviors (Ellis et al., 2005; Rapp & Mathieu, 2007). The current training program's lack of impact on knowledge or behavioral difference could be due to many factors that are likely specific to this study. The combined shared leadership and team skills training may have been too demanding to have meaningful impact. Additionally, pre- and post-test analyses indicate mostly insignificant results across the outcome variables. While the types of training had an impact on the final outcomes, overall, it would seem the training did not alter trainees meaningfully. The results of the current study should be understood within that context.

Overall, the different types of training had varied impacts, but provide a foundation for future research. Shared leadership training does impact the leadership network of a team and team skills training enhances an individual's ability to critically think about their own teamwork behaviors. Both unique findings emerged despite the drawbacks in this study, including the too-demanding combined training and lack of change in collaboration readiness during the training.

4.2 Collaboration Readiness

This paper set forth a theory of collaboration readiness that combines several disciplinary areas to better understand and measure an individual's readiness to work in a team. The study introduced an intervention (transportable teamwork competency training) to see if collaboration readiness differs depending on training received. Ideally a full training of transportable teamwork competencies would have shown greater collaboration readiness than component training or the control training, but results did not support that. There were very few differences between the interventions (the conditions) thus the type of training did not seem to impact collaboration readiness. Collaboration readiness did not show gains or losses after having received any intervention, except in three areas. Debugging cognitive strategies improved after receiving training. After receiving the training intervention, participants felt better able to use strategies to correct team errors. This is a positive and expected outcome of the training. Prosocial motivation decreased after receiving that training, thus individuals felt less desire to exert effort for their teammates. This finding is not expected, but not illogical. Motivation is an important aspect for readiness, but the timing of the measurement could have influenced participants' feelings of effort for others. Thus, this particular finding may have more to do with the training or measurement than the collaboration readiness construct. The final difference before and after training was an increase in knowledge of shared leadership. While a positive outcome for collaboration readiness, it is tempered by the fact that only half of the participants should have shown gains in this construct considering the different types of interventions.

4.2.1 Exploratory Analyses for Collaboration Readiness

The primary concern for the collaboration readiness construct is whether it is a sound model. A confirmatory factor analysis indicates the collaboration readiness model does not have acceptable fit, see Table 30. This indicates there is room for improvement in the measurement and the collaboration readiness construct. After examining the correlations and modification indices, I compared the original collaboration readiness model to other models: a four factor model that collapsed the knowledge of skills and the cognitive strategies dimension, a one factor model with one global collaboration readiness dimension, and a five factor model that removed the psychological collectivism measure from the enthusiasm for teaming dimension. Models with fewer factors did not improve the model fit compared to the originally hypothesized five dimensions. Removing the psychological collectivism scale from the enthusiasm for teaming dimension did improve fit and kept the original theory of five dimensions intact, but it did not improve model fit to an acceptable range.

Table 30 Confirmatory factor analysis for collaboration readiness model.

Model	χ^2	*df*	*CFI*	*RMSEA*
Five Factors (Original)	6140.31**	3070	.61	.08
Four Factors (collapse knowledge & cognitive strategies factor)	6148.15**	3077	.61	.08
One Factor	6312.20**	3080	.59	.08
Five Factors (w/o Psychological Collectivism)	3573.01**	2069	.73	.07

Note. **p<.001

Additional exploratory analyses tested to see if each collaboration readiness measure differed by condition and time. Hypotheses 5-7 tested for differences in post-test data only and Table 27 shows the overall pre-test and post-test differences overall, so this will add more information based on pre-test data and compare it to post-test data by

condition. Overall, there were differences for prosocial motivation, intrinsic motivation, monitoring metacognition, and knowledge of shared leadership.

Pro-social motivation differed across conditions for the pre-test, F (3, 174) = 3.21, p = .02, but did not differ for post-test results, F (3, 138) = 1.43, p = .24. Post-hoc analysis indicates that for the pre-test, the team skills condition (M = 4.16) reported higher prosocial motivation than the shared leadership condition (M = 3.78). Intrinsic motivation did differ by condition in the pre-test results, F (3, 174) = 6.38, p < .01, and the post-test results, F (3, 138) = 3.55, p = .02. Post-hoc analysis indicates that for the pre-test, the team skills condition (M = 3.85) reported higher intrinsic motivation than the control (M = 3.29) or shared leadership (M = 3.25) conditions, and for the pos-test, the team skills condition (M = 3.74) reported higher intrinsic motivation than the control condition (M = 3.08) and the full training condition (M = 3.15).

Monitoring metacognition did not differ by condition in the pre-test results, F (3, 169) = 0.69, p = .55, but did differ in the post-test results, F (3, 134) = 3.06, p = .03. Post-hoc analysis indicates that for the post-test, the full training condition (M = 3.73) reported higher monitoring metacognition than the control (M = 3.27). Knowledge of shared leadership did not differ across condition for the pre-test, F (3, 167) = 0.89, p = .44, but did differ across conditions for the post-test results, F (3, 130) = 3.66, p = .01. Post-hoc analysis indicates that for the post-test, the full training condition (M = 1.96) reported higher knowledge of shared leadership than the control condition (M = 1.48), team skills condition, (M = 1.52), and the shared leadership condition (M = 1.34). Table 31 shows full results.

Table 31 ANOVA of collaboration readiness before and after training by condition.

	Pre-Test			Post-Test		
Variable	*df*	*F*	*p*	*df*	*F*	*p*
Prosocial Motivation	3,174	3.21	.02	3,138	1.43	.24
Intrinsic Motivation	3,174	6.38	<.01	3,138	3.55	.02
Declarative Knowledge	3,170	2.10	.10	3,135	0.51	.68
Procedural Knowledge	3,170	0.51	.68	3,135	0.54	.66
Conditional Knowledge	3,167	1.63	.54	3,134	0.79	.50
Monitoring	3,169	0.69	.55	3,134	3.06	.03
Planning	3,170	1.99	.12	3,135	0.68	.57
Debugging	3,169	1.73	.16	3,135	1.14	.33
Evaluation	3,170	1.16	.33	3,135	0.70	.55
Self-Efficacy for Teamwork	3,168	1.68	.17	3,133	.1.19	.32
Psychological Collectivism	3,166	0.84	.48	3,130	0.79	.50
Enthusiasm for Teaming	3,166	1.79	.15	3,130	0.79	.49
Knowledge of Teamwork	3,167	0.89	.44	3,130	1.22	.30
Knowledge of Shared Leadership	3,167	0.89	.44	3,130	3.66	.01

Overall, only some of these findings have an impact on contextualizing the current study's results. The differences in pro-social motivation for the pre-test do not impact understanding the hypothesized results, nor do they add additional understanding of pre-test and post-test differences. The differences in knowledge of shared leadership for the post-test provide some insight into the null results in this study. Only those participants in the full training condition showed a statistically higher score on knowledge of shared leadership, when it was hypothesized that both full and shared leadership training should score higher.

Intrinsic motivation showed differences between conditions for pre- and post-test results, with the team skills condition often reporting higher than the other conditions. This adds new context to the results regarding the motivation dimension of collaboration readiness and Hypothesis 7. The interaction effect showed that any training is better than the control training, but that the full training condition was not as motivating as the team skills only or shared leadership only condition. Considering the team skills condition was

significantly higher for pre-and post-test, it could be that the training had no impact on intrinsic motivation for the team skills condition.

The differences in monitoring metacognition in the post-test results add further evidence that training had a differential impact based on the type of training received. For the cognitive strategies dimension of collaboration readiness, monitoring metacognition shows support for Hypothesis 5, such that team skills training impacts monitoring metacognition. Taken together, we see that both the team skills training and the full training show an impact on monitoring.

Debugging metacognition improved after transportable teamwork competency training, and the exploratory analyses indicate that there were no differences between conditions. This gives evidence that all conditions improved on debugging metacognition and no one particular training intervention (condition) was driving those results.

The differences between conditions for collaboration readiness can still be interpreted, but with caution due to the poor fit of the model. The five dimensions are intended to be discussed as part of the universal construct of collaboration readiness and the confirmatory factor analysis does not support discussing the results in that way.

4.3 Individual Differences and Utility Reactions

Previous group experience, social skills, and the Big-5 were initially measured to assess whether these needed to be included as model controls for their known association with team variables. Significant associations with study outcomes were expected, but significant differences between conditions was not. Ideally, there would be no individual difference variations between conditions. Previous group experience significantly differed by condition, such that the shared leadership condition reported less previous group

experience than the team skills training condition. Further exploratory analyses indicate that this finding is driven by two classes that are represented in each condition. PSYC 2015 in the shared leadership condition (M = .33) had significantly lower previous group experience than ME 2110 in the team skills condition (M = .54), F (5, 129) = 2.76, p = .02. This is not easily explained considering both classes are considered sophomore level classes and theoretically are taken by students at a similar level of experience in their college career. It is possible that PSYC courses differ in their use of teams than ME courses, which leads to differing levels of experience.

Conscientiousness also differed between groups, such that participants in the control condition were less conscientious than those in the team skills condition. Personality can impact those who emerge as leaders (Emery et al., 2013), so while a difference between conditions for conscientiousness is undesirable, it is acceptable for the particular conditions involved. Both the team skills training and control condition do not receive leadership training, so a statistical difference between these two groups should have little impact on hypothesized results comparing those who received shared leadership training and those who did not.

Differences existed between conditions based on year in school, such that the team skills condition had more underclassmen than upperclassmen than expected, but this is not surprising given the courses in each condition. The team skills only condition is mostly populated by participants from the ME 2110 course, which is primarily a sophomore-serving course and it's unlikely to have many upperclassmen. Across the sample, the individual difference measures did not indicate any extreme traits or experiences. The sample is from a school known for its rigor and intelligent students, so there was a

possibility that these participants would have extreme scores for personality or collaboration readiness. The individual differences did not indicate an unusual sample and there were no ceiling effects present for the collaboration readiness scores, so participants had room to improve.

Utility reactions are often used for training evaluation to assess how useful the participants believe the training to be. This was assessed before and after training, with a significant difference between the two. Unfortunately, perceived usefulness of the training decreased after having experienced the training. Without further follow-up with participants, it is difficult to gauge why that perception decreased. This finding was consistent across conditions and there were no significant differences between condition. The training may not have met the expectations of the participants, or the training was not useful for them. Either of these could have been remedied by a needs analysis to understand what training the participants and project needed. It is possible that the training was not as useful for participants personal growth, or that the training was inappropriate given the team project.

4.4 Future Directions and Limitations

4.4.1 Shared Leadership and Team Training

Future studies examining shared leadership training can use this study as a building block to create and assess shared leadership training program. This study focused on examining shared leadership training compared to team skills training to show it is a distinct competency worth including. Future work could focus solely on leadership, either comparing shared leadership training with other types of leadership training or focusing

more on leadership outcomes rather than broader team outcomes. One key takeaway for future studies is to remember the relational aspect of shared leadership and to consider using network analysis when appropriate.

The current shared leadership training focused on the concept of shared leadership but did not pair that with other styles of leadership. Tafvelin and her colleagues (2018) created a transformational leadership program targeted at informal leaders who would be sharing leadership. This is a fundamentally different approach to training shared leadership. In the current study, I focused on teaching individuals about shared leadership and how to share leadership, but not about specific methods or styles of leadership. In Tafvelin et al.'s study, they focused their leadership training on those who are assumed to be sharing leadership. These diverse approaches could be considered in future research for developing a shared leadership training program that best promotes learning.

The shared leadership training module culminated in a leadership plan completed by the team, but examination of those plans indicate that minimal effort may have been put into those plans. The wording of the leadership plans did not lend itself to detailed explanations and thus many respondents had short answers with little explanation. Appendix A details the plan for the entire training, including worksheet templates, and Appendix D provides the slides and lecture used for the training session.

This study was quasi-experimental, with project teams working on a real project together in a classroom. The training done in the classroom was designed such that students had interactions with their teammates to learn and practice key concepts during training and potentially practice these concepts on their own. While the training allowed for application and feedback, the application to their teamwork throughout the semester did

not allow for that feedback to be continuous. This lack of continuous feedback is a limitation in this study and is similar to traditional training concerns about transfer of training on the job (Kolb & Kolb, 2009). The training could be expanded to include an active facilitator or coach role in addition to dedicated training. This coach could ensure that the concepts the training emphasizes remain relevant and accessible to encourage continuous application and reflection.

Additionally, participants varied significantly in perceived difficulty and required interactions of the project which could have influenced the effort required to use team skills. This study attempted to balance those variations, but these effects still existed and can be controlled for in the future by focusing on an environment with teams working on the same team project or projects of similar difficulty and require high levels of interdependence. Improving coordination between training administrators and the instructors of the course could also improve the perceived support within the course and project.

Overall future studies could improve upon the training provided in this study. The shared leadership module could be enhanced to require greater effort to reflect and plan for team leadership. While the shared leadership content was purposefully not mentioned in the team skills modules, leadership has relevance for team skills. Content could be scaffolded throughout the training, with later modules referencing what was learned in earlier modules to better enhance learning and retrieval of training concepts (Karpick et al., 2104). Feedback from team members and supervisors (instructors) should be incorporated into the training itself, creating personalized module activities to best fit the individual's needs. A team coach or facilitator would be a useful role, but researchers would need to

explore this in a classroom context. It's unclear if the 'team coach' should be the instructor of the course or an outsider.

In addition to enhancement of the training, the evaluation of the training could have more depth. The project only followed the participants until the end of the team project. Future studies could follow participants beyond the initial team project where training occurred to assess whether participants retained and transferred what they learned to a new team context. Participants who engage in an application of the learned skills and techniques from this training would show they have transferred their learning to a new context. To truly assess this transfer, it would be prudent to have a needs analysis of what a participant needs to learn from training, compare that to what the participant learned in training, and then assess whether they still demonstrate what they learned in a new team context. It would be beneficial to have self-ratings, peer-ratings, and supervisor (instructor) ratings at each step. If collaboration readiness is not the outcome measurement used for training, then the evaluation should include measuring cognitive, skill, and affective change within individuals (Kraiger et al., 1993).

4.4.2 Collaboration Readiness

To address the limitations of this current study there are several paths for future research. One path could be to dive deeper into the collaboration readiness model to determine the appropriateness of the current dimensions and the measures used to assess them. The confirmatory factor analysis shows this model needs improvement and will likely need refinement for dimensions and measurement. Future studies could focus explicitly on refining the collaboration readiness construct.

Another path could introduce different methods of improving collaboration readiness. This study focused on team training of generic teamwork competencies, but it is possible that teaching a variety of teamwork development interventions would impact a person's readiness for teamwork (Shuffler et al., 2018). There are a variety of team training methods, such as crew resource management (Helmreich et al., 1999; Salas & Cannon-Bowers, 2001), cross training (Marks et al., 2002), or team self-correction (Smith-Jentsch et al., 2008). Once a collaboration readiness measurement is ready, it could be used to assess change using the multitude of team training methods and interventions that exist. Understanding how this criterion works in a variety of contexts would provide further support for the construct.

In addition to assessing collaboration readiness in various types of team training, future research can also assess the impact of collaboration readiness on various team processes and outcomes. Measuring team coordination, conflict, or communication can show if collaboration readiness is having positive impact on how the team functions, and measuring performance, satisfaction, and viability can assess if it has a positive impact on team outcomes. The goal of an individual who is 'collaboratively ready' is that they will have a positive impact on the team. It is also possible that a team of highly collaboratively ready individuals may experience better individual outcomes, such as less stress, but a mix or a team of less collaboratively ready individuals may have a negative impact on individuals. Working with others who can engage in teaming could reduce cognitive load and frustration compared to working with others who cannot.

4.4.3 Individual Differences and Manipulation Checks

While it was expected that some individual difference variables might impact study results, it was not expected to have differences between conditions. Unfortunately, there were some differences between conditions, mostly concerning the team skills training condition. The team skills training condition had more previous group experience compared to the shared leadership condition (but not the others) and was more conscientious than the control condition (but not the others). Additionally, the team skills condition and full training condition differed in distribution of years in school than what was statistically expected. Gender impacted a few study variables when there was no expectation that it should, but this should be interpreted cautiously considering 69% of respondents were male, overrepresenting the population. It is possible these underlying individual differences contributed to the null results in this study.

In addition to what was measured in this study, future studies could account for a wider range of individual differences. The measures used in this study focused on teamwork, namely previous group experience, social skills, and certain personality traits lend themselves to better performing team members. Considering the focus is also on shared leadership specifically, other individual difference measures should be considered such as individualism/collectivism, power distance, previous leadership experience, empathy, or self-monitoring as these could impact leadership emergence (Chen et al., 2011; Emery et al., 2011).

Other individual differences to consider in future research is adequately identifying ‘lone wolves’, or individuals who dislike teamwork and prefer to work alone (Barr et al., 2005). These individuals can negatively impact teamwork and may be more resistant to

team training. This construct could be measured with a specific Lone Wolf scale, or by assessing commitment and job involvement (Barr et al., 2005; Ingram et al, 1991).

Ideally participants would have reported similar levels of project difficulty, interdependence, and support but the results from the manipulation check items did not support this. While only three had impacts on study variables (project difficulty, project requires high level of interaction, and support from instructor), many of the items differed based on course/instructor. Thus, by nature of what class the participants were in they reported different levels of difficulty, interdependence, and support. This lends further evidence that future studies done with class-based teams should carefully consider the use of multiple classes. This study focused on developing shared leadership and the collaboration readiness criterion, so it may not have been appropriate to have multiple class types at this stage. Once those were established, they could be compared across various class types.

4.4.4 Threats to Study Validity

It is important to discuss the possible reasons for the numerous null results in this study. This discussion is structured in three ways: the sample, the training, and the measurement. It is possible the sample itself was not appropriate, either in terms of the participants needing this training or these student teams are significantly different from workplace teams. The training may have had problems with execution or poor design that limited learning, or the measurement of study outcomes were not appropriately capturing change.

4.4.4.1 Threats to Study Validity: Sample

The sample in this study was chosen because these students were in classes where teamwork was important and learning to work in a team was a stated course goal. For the majority of these classes, the course goal of learning to work in a team was not taken lightly by the instructor but was thoughtfully implemented because it is a valuable skill to employers and helps prepare students for future employment (Borrego et al., 2013; Drake et al., 2006; Froyd, 2005; Goliat et al., 2013). Thus, the study was carried out in these classes believing the students needed this training, but training needs analysis was not conducted. This analysis would help to know for certain if this training was the right match for the needs of this sample. The pre-test results for collaboration readiness suggest there could have been some room for improvement, but the participants' scores did not meaningfully change after receiving the training.

In addition to selecting courses where learning to work in a team was a stated course goal, the team task was taken into consideration. Participants need to engage in team tasks that are comparable to team tasks in the workforce. Many of the courses selected were senior design courses where students worked on real-world problems similar to what they may see once employed. The courses that were not senior design (PSYC 2015 & ME 2110) also engaged in team tasks that were relevant for to careers related to their majors. For all participants, the team projects they engaged in required relevant knowledge and skills for the workforce and mimicked activities they could engage in as an employee.

While every effort was taken to select courses that mimic employee workplace teams, student teams are not actual teams in the workplace, which may limit the generalization to all workers. There are differences between student teams and employee workplace teams that need to be considered. The team task should be generalizable beyond

the classroom, but it is still a class-based task. Students may be more motivated by doing what is necessary to earn a certain grade rather than what is best for the team project. Similarly, students may be operating under the assumption they won't need to work with their teammates again after the project is over since they will no longer be in a class together. The knowledge that the student must only work with their team for a limited time may influence the team skills engaged in, such as not addressing team conflict appropriately or settling for lower standards. Students may feel they only need to last until the end of the semester and do not worry about their project or team after the semester is over. This is unrealistic to the workplace, as the quality of the project and relationships with coworkers will impact the individual beyond the deadline of the project.

Future studies could assess students' motivations for team project outcomes to account for differences in those who are grade-motivated and those who are motivated by the team task. Interviews or other measures could be used to assess student feelings and perceptions at the end of the project to ascertain whether the time-limited nature of the project influenced their thoughts, feelings, or behaviors regarding teamwork. Additionally, team viability and satisfaction could be measured to account for differences in individual outcomes. This could provide insight into how students feel about their teammates and whether their knowledge of limited time with their teammates has an impact the study.

The non-response analyses highlighted differences between those who were included in the team-level analyses and those who were not, namely those who felt more supported in the course and training were more likely to provide complete team data. Further analyses revealed there were course differences in team project and training support, as well as differences in perceptions of the team project. Some of these had

significant results with the study outcomes and were used as controls but the widespread differences between the courses could still bias the data. This is a limitation for this study that could be controlled for by utilizing the same instructor and course for all data collection, but this presents its own logistical and theoretical issues. Relying on one instructor and course would elongate data collection time. The instructor will also learn and grow over time and their own course support could vary from semester to semester.

This study focused on training shared leadership, and while the sample was comparable to a self-managed team in a workplace, the context of the team is not comparable. Teams in the workplace are embedded in an organizational hierarchy and potentially have interactions with other coworkers or teams for support. This sample of student teams was in a simple organizational structure, with all students being of equal power and under the leadership of an instructor and possibly teaching assistants producing minimal levels of hierarchy (students, then teaching assistants, and then the instructor). While there is a hierarchy the instructors are employed in, this usually has no bearing in the classroom. Additionally, there is no need to communicate or collaborate across teams. Students do not view classmates as coworkers and may spend little to no time with them. These differences make the student teams less generalizable to organizations, especially in the context of training shared leadership.

4.4.4.2 Threats to Study Validity: Training

In addition to the sample, the training itself could explain the null results. Efforts were made to standardize training of modules to all participants, though there were some anomalies with execution and teams. These anomalies are detailed in Appendix C. While not all anomalies can be known to researchers ahead of time, future research could focus

on obtaining a larger sample, such that these anomalies will have little impact on the results of the study. The training was developed based on best practices for learning, but the training had few measures to specifically assess its effectiveness. The majority of measures used to assess training outcomes in this study are new or are not commonly used to assess training effectiveness, thus it's difficult to say with certainty the training does (or does not) effectively train the desired teamwork competencies. Future research regarding collaboration readiness should ensure that any training used to assess differences has been thoroughly evaluated and shown to change participants knowledge and behavior.

4.4.4.3 Threats to Study Validity: Measurement

Measure refinement for assessing the training and collaboration readiness is likely needed. Despite having some knowledge, behavioral, and cognitive measures to assess the training, the created and chosen measures may not have been appropriate as evidenced by the confirmatory factor analysis. The knowledge tests indicated no difference in teamwork skills knowledge after receiving training and the pre-test versus post-test analyses indicated participants experienced an increase in shared leadership knowledge after receiving training. Further exploratory analyses revealed that the full training condition scored significantly higher than the rest of the conditions and the shared leadership training condition was not significantly different from the other conditions. The shared leadership condition should not have the lowest average score on the knowledge test. This signals a problem with the training or a problem with the knowledge scales, and future research should ensure that the knowledge scales are assessing the intended knowledge. For the behavioral tests, there were significant results using the established sociometric item for shared leadership but no results for the study-created sociometric items for teamwork

behaviors. Future research should explore the teamwork behavior items in other non-training contexts to either refine the items or determine if individuals can accurately reflect and rate these behaviors in teammates.

The measures used to assess collaboration readiness were established scales, with some scales adapted to refer to teamwork. Considering the confirmatory factor analysis did not show an acceptable fit for my hypothesized model, this is another reason for cautious interpretation of the null findings related to this study. The concept of collaboration readiness, the five suggested dimensions, and the measurement of those dimensions likely need refinement.

A final consideration regarding measurement includes the timing. The post-test survey was conducted at the end of the team project, not the end of training. The training concluded about halfway through or earlier in the team project. The reasoning to collect data at the end of the project was to allow participants the time to practice what they learned in their teams for the remainder of the team project. It is possible that the responses to surveys could have been confounded with feelings regarding the end of the project. Future research should assess at the conclusion of training and the end of the team project, as well as assess participants affective state at the end of the project. As previously discussed, the sample involved students who may have unique motivations and feelings regarding the end of the project. Assessing those motivations and satisfaction can also help ensure that the timing of outcome measurements is not influenced by the students' perceptions of their grades or teammates.

4.5 Theoretical and Practical Implications

The contributions from this study range from new theoretical models to practical concerns for training programs. Starting with the implications from the shared leadership training, the overarching contribution is the use of a relational analysis to understand training outcomes. Social network analysis is not typically used to measure changes due to training, but is highly appropriate when relational concepts are being trained and could open new ways of thinking about measuring training impact. This study also provided more knowledge of training shared leadership and specifically training team members to understand and manage the leadership within their team. The impact was minor but can provide inspiration for future directions.

A person's ability to work in a team is a highly important skill for employers (NACE, 2018) and collaboration readiness is a theoretical model aimed at measuring an individual's readiness for teamwork. A major theoretical contribution from this study was the development of a collaboration readiness model focused on the individual. This model needs further research but will eventually have implications for showing employers a person's teamwork readiness. This could help identify training needs or be used in selection where teamwork skills are necessary.

This study highlights the difficulty of team training programs in a university classroom setting. There were several findings that seemed to be driven by the nature of the sample, such as what class the students were in, or could have been influenced by student motivations for grades. Practical guidance from this study includes increasing methodological control where possible and measure students' motivations regarding classwork, even if it seems unrelated to the team training. The development of a shared leadership training program does not need to be done in a university setting, so this could

be done in organizations. Collaboration readiness should be a construct relevant for university students and the workplace, so further development of this construct could occur in either setting as long as it was tested broadly eventually.

4.6 Conclusion

The findings in the current study suggest that training generic teamwork competencies to increase collaboration readiness is complex. Shared leadership is an important teamwork competency and training it showed modest behavioral change. This study's findings suggest that training can impact a person's cognitive strategies and motivation, two of the key facets of collaboration readiness. The model of collaboration readiness measured in individuals requires further development to determine the appropriateness of the dimensions and measures.

APPENDIX A. DESCRIPTION OF TRAINING PLAN

Session: Value of the Team

Assignments & Time

Pre-Class: 40 Minutes

During Class: 0 Minutes

A. Individual Work:

1. Watch the Value of Teams video (2.32 minutes)
   https://youtu.be/pQK2ByfUoVY
2. Complete the Value of Teams assessment and turn in via T-Square.
   a. What are the benefits of working in a team?
   b. What are the costs of working in a team?
   c. What is the benefit of your class project being completed as a team project?
   d. What are your personal goals for the class?
   e. What are your personal goals for the team project?
   f. What are your personal goals for your team dynamics?
3. Take the Strengths Finder online assessment and report your results.
   a. Read through the strengths report and highlight the words, phrases and sentences that most resonate with you.
   b. Think about a successful project that you have done in a team. Think about how you contributed to the success of the team. How did you use your strengths in that project? What did you like about what you did on that team?
   c. Keep your responses from parts 2 and 3 ready to discuss during Session 1.

Session: Managing Diversity

Assignments & Time

Pre-Class: 0 Minutes

During Class: 50 Minutes

A. Agenda for facilitation of team discussion:

1. Introduction to the Effective Team Dynamics Project.
2. Refer back to your answers from Session 0. Share with your group a successful project that you have worked on where you contributed positively to the project's success. What was the project? Why do you think that it was successful? What was your role in that success? What did you like about working on that project? How did you use your strengths in that project? Facilitator will visit with teams during this time.
3. Facilitator will provide students with five theme cards based on their strengths. Students will look at their theme cards and specifically look at the "I hate" statements on the card. Thinking about the five "I hate" statements, students will pick the one that they feel the most passionate about and put this one on the top of the stack.
4. Now each member of your team will share with the members of your team the "I hate" statement that they are most passionate about and will explain to the team what it means to them (in practice). Then the team will identify a plan for considering this "I hate" statement using the work sheet below. Students will upload their plan to T-Square.
5. Questions

B. In Class Worksheet:

This worksheet will be used to capture the discussion of how the team can work well with each other by knowing (and planning for) what each member "needs" and "needs to avoid" during the team project.

Team Name _____

Name of team member 1 _____

What they do not like: behaviors in a team (from the "I hate" statements) and how the team is going to plan for this.

_____

This is related to their _____ theme/strength (from the StrengthsFinder results)

Session: Shared Leadership & Roles

Assignments & Time

Pre-Class: 0 Minutes

During Class: 50 Minutes

A. In-Class

1. As students enter classroom, they will be given the individual worksheet to complete.
2. Split the class into two groups and pass out logic puzzle clues, but do not have students look at them.
3. After 7 minutes have pass from the start of class, start the logic puzzle activity.
4. As students complete the activity, be available for questions.
5. Show the activity solution as well as the students results.
6. Class discussion questions.
7. Lecture on Shared Leadership.
8. Have students complete group discussion and leadership plan.

B. Worksheets:

Individual Worksheet

1. What type of leader roles have you played previously?
2. What type of leader role do you wish to have with this current project?
3. How do your strengths influence the leadership roles you are interested in?

Group Worksheet

Discussion Questions:

1. What leadership style resonates with you?
2. What leadership style will work best for your team?

Leadership Plan:

1. Team Member:

Role:

How does this relate to a person's strengths?

2. Team Member:

Role:

How does this relate to a person's strengths?

3. Team Member:

Role:

How does this relate to a person's strengths?

4. Team Member:

Role:

How does this relate to a person's strengths?

5. Team Member:

Role:

How does this relate to a person's strengths?

What will leadership look like in your team?

Session: Team Norms

Assignments & Time

Individual: 20 Minutes

Group: 30 Minutes

A. Individual pre-discussion work:

1. Watch the team contract video: https://youtu.be/8sXzo29V6bo.
2. Complete Worksheet A
3. Have your team plan from Session 1 ready for your group discussions.

B. Group discussion and contract writing:

1. Review the team plan that was made in response to the "I hate" statements in Session 1.
2. Discuss the norms that are most important to each team member.
3. Complete the contract and submit a copy.

C. Worksheets:

Worksheet A:

1. Task norms are how tasks are executed, how to set priorities, how to delegate tasks, etc. What task norms are important to you?
2. Interpersonal norms are how to communicate with teammates, how to deal with conflict, etc. What interpersonal norms are important to you?
3. How do your strengths influence what norms are important to you?

Team Contract:

PURPOSE: The purpose of developing a team contract is to jump-start your work together as a team, to help avoid the problems commonly faced by many teams, and to facilitate continual improvement of your teamwork throughout the entire project. By addressing the following issues, you should be able to enhance your team performance, member satisfaction, and learning.

We know that you have already discussed some of these concepts already-that was on purpose. Having completed some of those discussions already should help facilitate completing this contract. The point of the contract is to have the discussion AND agree on set norms.

INSTRUCTIONS: Develop your team contract through mutual discussion and consensus during your team meeting. Please complete the following components.

Shared Cognition:

a) What is your team's goal for this project?

Roles:

a) What will be each person's role?

b) Will roles change and adapt? How?

Communication Norms:

a) Will your team have regular team meetings? When and where will your team meet?

b) How will you meet as a team? (face-to-face, using video conferencing, etc.)

c) What are the rules for your team meetings?

d) What will be your method of completing assignments (virtual meetings, face-to-face meetings, splitting up the work, etc.)

e) What are the norms for responding to virtual communication? (e.g., respond to emails within 24 hours, etc.)

Operating Guidelines:

a) How will your team make decisions?

b) What are your team's expectations regarding team member performance and contribution quality?

c) What are your team's expectations regarding cooperation and attitudes?

D) What are your team's expectations regarding meeting attendance, punctuality, and participation?

Conflict Management:

a) What strategies will your team will use to resolve differences of opinions among members?

b) What strategies will your team use to deal with non-cooperative or underperforming members?

c) How will your team handle unexpected issues (e.g. family emergencies, illnesses, etc.)?

Outside Commitments:

a) What outside commitments (family, job, personal) that could impact an individual's ability to work on this team project?

Indicate full team agreement on these decisions: All Team members must indicate their agreement by typing their names at the bottom of this document.

Session: Conflict Management

Assignments & Time

Pre-Class: 0 Minutes

During Class: 50 Minutes

A. Pre-Class individual work:

1. Watch this video about team conflict and conflict management. https://youtu.be/5WyET_ZYqjs
2. Complete Worksheet A

B. Agenda for facilitation of team discussion:

1. Review of how the teams are functioning and answer any questions that the teams might have at this point in the semester.
2. Individuals will share with their team their conflict management style, if they believe it's an accurate reflection of themselves, and how their strengths relate to their style. The facilitator will visit with teams and engage in discussions.
3. Teams will complete a conflict management task. Each team will be given four scenarios and the team will discuss the best way to resolve conflict. The facilitator will visit with teams and engage in discussions.
4. Introduction to Critical Conversations and idea that critical conversations are not to be avoided.
5. Model a critical (crucial) conversation.
6. Students will complete Worksheet B and practice a crucial conversation.
7. Questions

C. Worksheet:

<u>Worksheet A: Individual</u>

1. Go to the following site and complete the conflict management survey: http://academic.engr.arizona.edu/vjohnson/ConflictManagementQuestionnaire/ConflictManagementQuestionnaire.asp

2. Do you believe your results reflect how you tend to handle conflict?
3. In your own words, how would you describe your conflict management style?
4. How do your strengths relate to your conflict management style?

Worksheet B: Crucial Conversation in Groups

Crucial Conversations –This worksheet will be used to navigate through a crucial conversation.

Team Name _____

Name of team members _____

1. What is the common desire/goal of the people who need to have the conversation and how will you ask the person to have the conversation with you? Example 1: *You might want to say, "I have something I'd like to discuss with you that I think will help us work together more effectively."

Example 2: I know that we both want to have a successful project, could we talk about something that happened at our last team meeting?

2. What are the observable FACTS surrounding the situation?

3. What is the "story" that you built based on the facts above?

You might say, "This made the think_____."

4. Now listen to the person that you are having the conversation with. What was the result? Did the other person have a very different point of view? How did their strengths make their pattern of behavior and pattern of thought different from yours?

APPENDIX B. STUDY MEASURES

Previous Group Experience

Instructions: Are you a member of any of the following groups?

Response Items: Yes or No

1. Fraternities/Sororities
2. Clubs/organizations
3. Sports teams (both varsity or intramural)

Social Skills

Please use the rating scale below to describe how accurately each statement describes you.

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

1. I find it easy to put myself in the position of others.
2. I am keenly aware of how I am perceived by others.
3. In social situations, it is always clear to me exactly what to say and do.
4. I am particularly good at sensing the motivations and hidden agendas of others.
5. I am good at making myself visible with influential people in my organization.
6. I am good at reading others' body language.
7. I am able to adjust my behavior and become the type of person dictated by any situation.

IPIP-Big 5

Please use the rating scale below to describe how accurately each statement describes you.

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

1. Am the life of the party.
2. Sympathize with others' feelings.
3. Get chores done right away.
4. Have frequent mood swings.
5. Have a vivid imagination.

6. Don't talk a lot.
7. Am not interested in other people's problems.
8. Often forget to put things back in their proper place.
9. Am relaxed most of the time.
10. Am not interested in abstract ideas.
11. Talk a lot to different people at parties.
12. Feel others' emotions.
13. Like order.
14. Get upset easily.
15. Have difficulty understanding abstract ideas.
16. Keep in the background.
17. Am not really interested in others.
18. Make a mess of things.
19. Seldom feel blue.
20. Do not have a good imagination.

Utility Reactions

Instructions: For each of the following statements, indicate how much you agree with the statement. These statements refer to your course that is participating in the Effective Team Dynamics project.

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

1. This training will impact my current and future teamwork.
2. This training is relevant for working in teams.
3. This training has practical value.

Knowledge test for Team Skills and Leadership

Instructions: For each of the following questions, choose the best answer.

Module: Norms

1. Teams can set task norms which are….

   a. **Agreed upon rules of how to execute tasks or set priorities.**
   b. Agreed upon rules of how to manage conflict or how to communicate.
   c. Agreed upon rules of how to evaluate one another at the end of the project.
   d. Agreed upon rules of how to discuss problems with the instructor.
2. Liam expresses that he prefers to deal with team conflict directly whereas his teammate Devraj prefers to avoid it. These teammates are discussing…
   a. Contingency norms
   b. Task norms
   c. Interpersonal norms
   d. Evaluative norms
3. The purpose of a team contract is to…
   a. Force the team into a set of behaviors for the entirety of the project
   b. Guide team discussions of preferred norms and create a document that explicitly describes agreed upon norms
   c. Provide teams with a list of recommended competencies
   d. Encourage adopting best practices of teamwork

Module: Conflict & Conflict Management

1. Conflict within a team is best represented as
   a. A single facet and always detrimental to the team.
   b. A single facet and always beneficial for the team.
   c. Multifaceted and usually bad for team performance
   d. Multifaceted and complex, with some types hurting team performance and others benefiting team performance.
2. Which of the following is true about conflict management?
   a. Individuals have one style of conflict management that they should always use
   b. Teams should agree on one style of conflict management to always use
   c. Individuals have a style of conflict management they tend to use but should assess the situation to see if it is appropriate

d. Teams should use the conflict management style supported by the leader of the team.

3. Tammy tends to argue with her teammates about the best way to achieve their team goal. These disagreements sometimes lead to worse team dynamics but other times contributes to better ideas. Tammy is exhibiting…
    a. Task conflict
    b. Cooperative conflict management
    c. Process conflict
    d. Competing conflict management

Module: Shared Leadership

1. Individuals within a team can share leadership responsibilities across…
    a. Members, roles, and tasks
    b. Members, time, and roles
    c. Time, tasks, and status
    d. Tasks, members, and status
2. Hierarchical leadership involves…
    a. One individual giving structure and support to the team
    b. One individual giving structure and a different individual giving support to the team
    c. All team members collectively deciding structure and providing support to one another
    d. All team members collectively deciding structure with one individual advocates for the team to external stakeholders.
3. Cass has been setting goals and organizing her team, whereas Kal has been settling disagreements and motivating his teammates. Both are in the same team and are seen as leaders within their team. What does this situation demonstrate?
    a. Hierarchical leadership
    b. Shared leadership
    c. Vertical status
    d. Flat status

Shared Leadership Behaviors Sociometric

1. Who does your team rely on for leadership (choose all that apply)

Team Skills Behaviors Sociometric

Instructions: For each of the following statements, indicate how much you agree with the statement.

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

1. X is effective at leveraging the differences between teammates
2. X is effective at team coordination and planning
3. X is effective at using conflict management skills and knowledge

Pro-Social & Intrinsic Motivation

Instructions: For each of the following statements, indicate how much you agree with the statement

Why are you motivated to do your work on your team project?

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

Pro-Social Motivation

1. Because I care about benefiting others through my work
2. Because I want to help others through my work
3. Because I want to have positive impact on others
4. Because it is important to me to do good for others through my work

Intrinsic Motivation

1. Because I enjoy the work itself
2. Because it's fun
3. Because I find the work engaging
4. Because I enjoy it

Teamwork Metacognition: Knowledge of Cognition

Instructions: For each of the following statements, indicate how well the statement describes you.

Response Items: 1= Very untrue of me, 2= Untrue of me, 3=Neutral, 4=True of me, 5=Very true of me

Declarative knowledge-Knowledge about one's team skills, intellectual resources, and abilities

1. I understand my strengths and weaknesses in my abilities to be a good teammate
2. I know what team skills are most important to learn
3. I am good at organizing information related to team skills
4. I am good at remembering information related to team skills
5. I have control over how well I learn team skills
6. I am a good judge of how well I understand my own abilities as a teammate
7. I learn more about team skills when I am interested in working with my team.

Procedural Knowledge-Knowledge about how to implement team skills (e.g. strategies)

1. For teamwork, I try to use strategies that have worked in the past
2. I have a specific purpose for each teamwork strategy I use
3. I am aware of what strategies I use when I interact with my team
4. I find myself using helpful teamwork strategies automatically

Conditional Knowledge-Knowledge about when and why to use team skills

1. I learn new team skills best when I already know something about team skills
2. I use different teamwork strategies depending on the situation
3. I use my strengths to compensate for my weaknesses as a teammate
4. I know when each teamwork strategy I use will be most effective

Teamwork Metacognition: Regulation of Cognition

Instructions: For each of the following statements, indicate how well the statement describes you.

Response Items: 1= Very untrue of me, 2= Untrue of me, 3=Neutral, 4=True of me, 5=Very true of me

Monitoring-assessment of one's team skill use

1. I consider several alternatives to a teamwork-related problem before I proceed
2. I ask myself if I have considered all options when solving a teamwork-related problem
3. I periodically review to help me understand important connections among team skills
4. I find myself analyzing the usefulness of teamwork strategies
5. I find myself pausing regularly to check my effectiveness as a teammate
6. I ask myself questions about how well I am doing while I am learning new team skills

Planning-planning and goal setting, prior to engaging team skills

1. I pace myself while learning in order to have enough time
2. I think about what I really need to use team skills for, before I begin a task
3. I set specific goals to use specific team skills before beginning a task
4. I ask myself questions about appropriate team skills to use before I being a task
5. I think of several ways to solve a teamwork-related problem and choose the best one.

Debugging strategies-Strategies used to correct team management errors related to team skills

1. I ask others for help when I am unable to manage a teamwork-related problem
2. I change strategies when I fail to effectively use a teamwork strategy
3. I reevaluate my assumptions when I am faced with a teamwork-related problem
4. I stop and assess my teamwork strategies when my team acts unexpectedly

Evaluation-Analysis of performance and strategy effectiveness after a teaming episode

1. At the conclusion of a team project, I know how well I collaborated with my teammates
2. I ask myself if there was an easier way to effectively collaborate after I finish a task
3. I ask myself how well I accomplished my teamwork-related goals when I'm finished
4. I ask myself if I have considered all options after solving a teamwork-related problem
5. At the conclusion of a team project, I ask myself if I used team skills as effectively as I could have
6. At the conclusion of a team project, I ask myself if I used effective team skills as much as I could have

Generalized Self-Efficacy for Teamwork:

Instructions: For each of the following statements, indicate how well the statement describes you interacting in a team.

Response Items: 1= Very untrue of me, 2= Untrue of me, 3=Neutral, 4=True of me, 5=Very true of me

1. I can always manage to solve difficult problems related to working with my team if I try hard enough.
2. If someone outside the team opposes my team, I can find the means and ways to get what the team wants.
3. I am certain that I can accomplish my teamwork-related goals.
4. I am confident that I could deal efficiently with unexpected events when working with my team.
5. Thanks to my resourcefulness, I can handle unforeseen situations when working with my team.
6. I can solve most teamwork problems if I invest the necessary effort.

7. I can remain calm when facing teamwork difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem when working with my team, I can find several solutions.
9. If I am in trouble when working with my team, I can think of a good solution.
10. I can handle whatever comes my way when working with my team.

Psychological Collectivism

Instructions: Think about the work groups to which you currently belong, and have belonged to in the past. The items below ask about your relationship with, and thoughts about, those particular groups. Respond to the following questions, as honestly as possible, using the response scales provided.

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

1. I preferred to work in those groups rather than working alone.
2. Working in those groups was better than working alone.
3. I wanted to work with those groups as opposed to working alone.
4. I felt comfortable counting on group members to do their part.
5. I was not bothered by the need to rely on group members.
6. I felt comfortable trusting group members to handle their tasks.
7. The health of those groups was important to me.
8. I cared about the well-being of those groups.
9. I was concerned about the needs of those groups.
10. I followed the norms of those groups.
11. I followed the procedures used by those groups.
12. I accepted the rules of those groups.
13. I cared more about the goals of those groups than my own goals.
14. I emphasized the goals of those groups more than my individual goals.
15. Group goals were more important to me than my personal goals.

Enthusiasm for Teaming

Instructions: For each of the following statements, indicate how much you agree with the statement.

Response Items: 1= Strongly Disagree, 2= Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

1. Given my experiences with teams, I would prefer to work alone than in a team in the future.
2. Being on teams has decreased my enthusiasm for working in a team in the future
3. If given the choice, I would choose to work in teams in the future.

Manipulation checks:

For each of the following statements, indicate how much you agree with the statement. (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree)

1. I found this project interesting
2. I found this project difficult
3. I found this project important
4. Success on this project requires high levels of interaction between each member of the team.
5. The project will go better if I work on my part and my teammates work on their parts and then we combine.
6. My instructor provided support for working in a team
7. The course provided support for working in a team
8. The Effective Team Dynamics facilitators provided support for working in a team

For the following questions, estimate the percentage of time you spent working on the project.

9. Of your time on the project, how much did you spend on:
   Planning for this deliverable?
   Executing this deliverable?
   Making sure everyone was on the same page?
   Helping others who were having difficulties with the project?

APPENDIX C. EXPLANATION OF DATA COLLECTION ANOMALIES

Table 32 Anomalies that impacted study data collection and how it impacted the study.

Course	Anomalies
Summer 2018 ME 4182	Unlike all other courses, the assigned lecture time was not actively used by the instructor of the course. Students were not accustomed to attending the lecture time and thus only 1 team arrived for training days. The first training day was offered again to encourage other students to attend but had no attendance.
Summer 2018 CHBE 4520/4530	This was the only course that explicitly assigned leaders within teams and these leaders changed over time. Knowing that, this class was specifically excluded from non-leadership training conditions. This class had all teams working on the same problem, which could have impacted results.
Summer 2018 ME 2110	This class had all teams working on the same problem, which could have impacted results.
Spring 2018 All Courses	A survey error prevented the collection of some biographical information (gender, year in school, ethnicity)

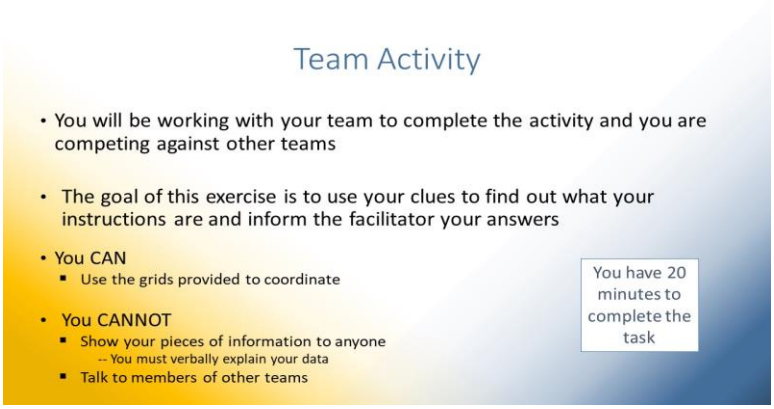
APPENDIX D. SHARED LEADERSHIP TRAINING SLIDES

As students enter classroom, hand out the individual worksheet to complete.

As students work on the individual worksheet, hand out the Team Activity clues to students, but do not have them look at the clues.

Give students about 7 minutes from start of class to finish individual worksheet.

Monitor progress to see if you can start early.

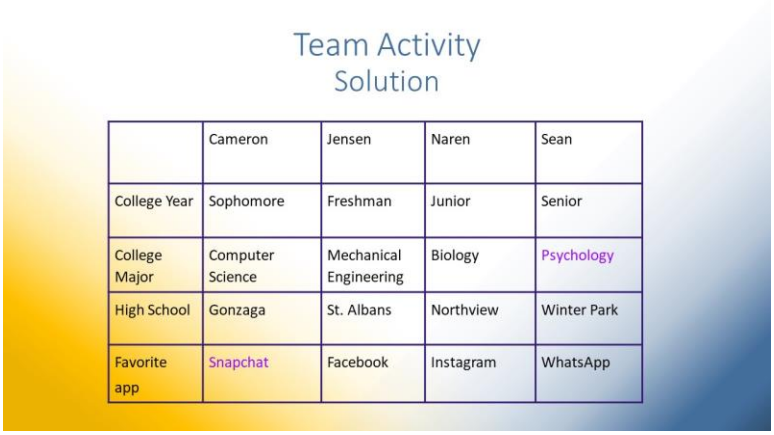


At this time, pass out the puzzle grid and explain the activity.

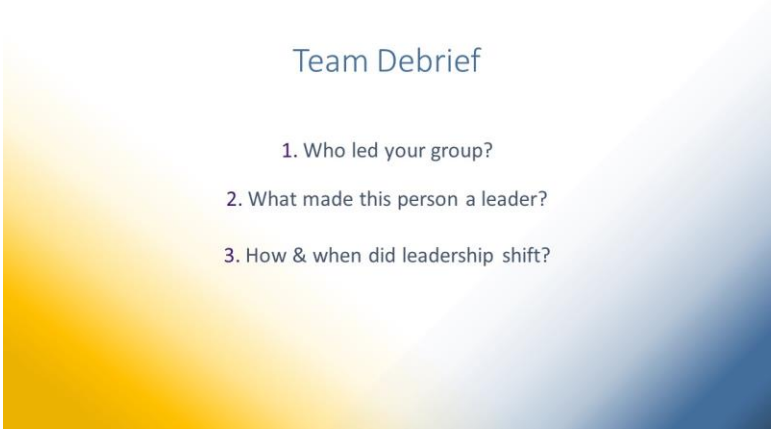
"You will be working with your team to complete the activity and you are competing against other teams. The goal of this exercise is to use your clues to find out what your instructions are and inform the facilitator your answers. Each of you have been given your own personal clues. You CANNOT show these clues to others or talk to other teams. You must verbally describe your information. You can use the grids provided to coordinate within your team. Remember the goal of this activity is to figure out what your instructions are and provide me the responses related to your instructions. You will have 20 minutes to complete the task and you're competing to see what teams can provide me responses first."

As students complete the activity, be on hand to answer questions to provide clarity but you cannot help them solve the puzzle.

Keep track of responses and how long it took each team. Put the responses in this slide to show who said what. Briefly highlight results.



This is the solution. Have students compare how well they did/close they got. Don't spend too long here.



Ask all students to individual answer these questions. “Flip over your grid and write out the answers to these questions”.

Once students are done, have them compare results as a team.

“Who led your group?”-Look for answers that highlight only one leader or multiple leaders.

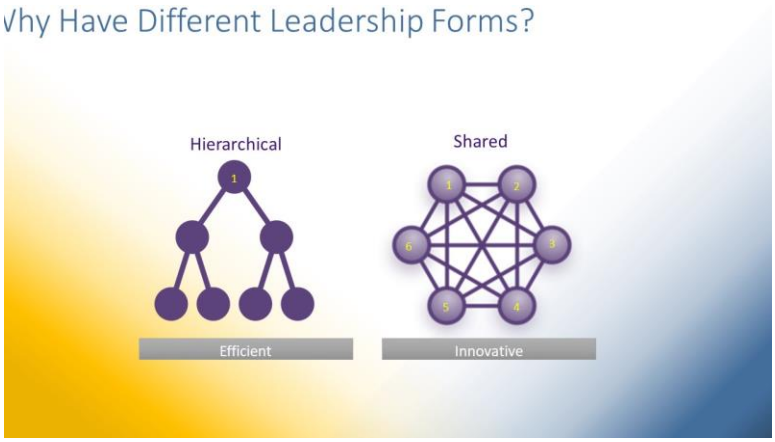
“What made this person a leader?”- Look for answers that highlight different behaviors that led to someone being considered a leader. Give nudges- person who spoke the most, person who coordinated, person who recorded answers/compiled answers.

“How and when did leadership shift (if it did)?”-Look for answers that describe how one person started as a leader and then it shifted to someone else being a leader. Was it because of how students behaved? Did you see this person as a leader the whole time?

At this point we are moving to describing different styles of leadership.

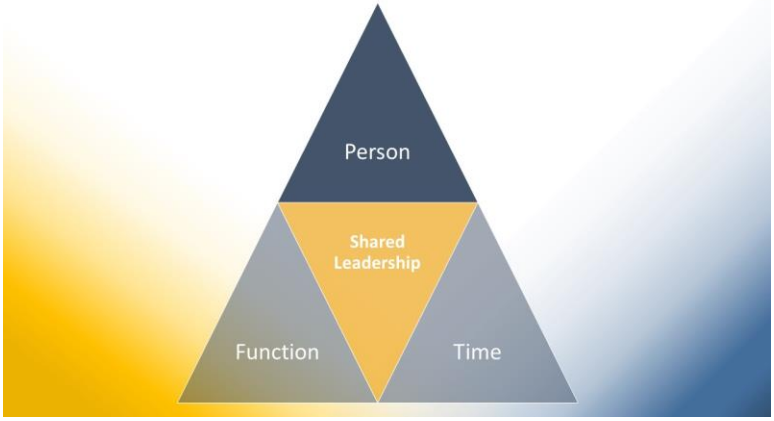
"One way to look at leadership that is probably very familiar to you and common in workspaces is hierarchical leadership. There is one leader at the top who is influencing the rest of the team. They set the goals, delegate tasks and responsibilities, coordinate the team, manage performance and keep morale high."

"A different way to look at leadership is that multiple members of the team share leadership. The functions of a leader are spread across different members of the team where some individuals lead by coordinating and delegating tasks and others lead by managing performance and keeping morale high. You might find this shared leadership more often in you project teams and with teams that have no formally assigned leader or when individuals have the same level of authority over each other. This doesn't mean everyone is sharing leadership, but rather multiple teammates are."

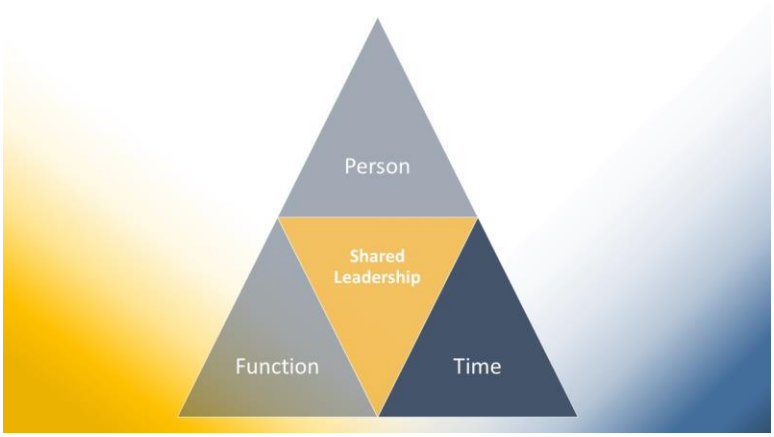


"I just described two forms of leadership-this is just how it can look in the team, the different styles leaders take can always vary. The different forms are important to consider because sometimes one is better than the other. For example, hierarchical can be more efficient when one person must do all the coordinating and managing. Shared leadership forms can allow for more information sharing which leads to creative solutions. Since you will likely be in teams where no one has formal authority over each other, you may find yourselves naturally engaging in shared leadership. So today we will focus on what shared leadership involves."

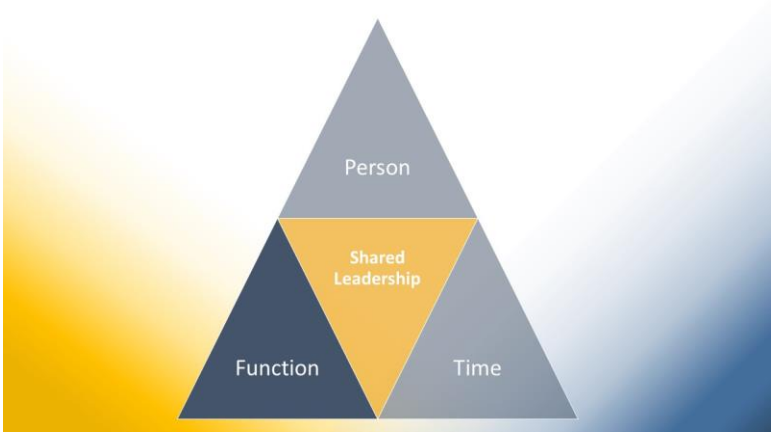
“When looking at shared leadership, we can see that leadership varies by who is considered a leader, what functions the leaders hold, and how leadership can shift over time.”



“The very basis of shared leadership is that multiple people are seen as leaders within the team. Shared leadership exists when someone perceives another as a leader and that person sees themselves as a leader.”



“The next piece of shared leadership is time. Essentially, who is seen as a leader and the different behaviors an individual enacts can change over time. One teammate might be seen as a leader at the beginning of the team project but later it shifts to someone else being seen as the leader. What roles or functions people do can change over time which might impact who is seen as a leader. Think about your own projects and semesters-at some point someone who is leading might back away for some time because they have several tests and interviews to prep for and so another teammate steps up and takes over. Within this form, you could have one person leading and engaging in all the leadership behaviors, but who that person is shifts over time and that would still be considered shared leadership.”



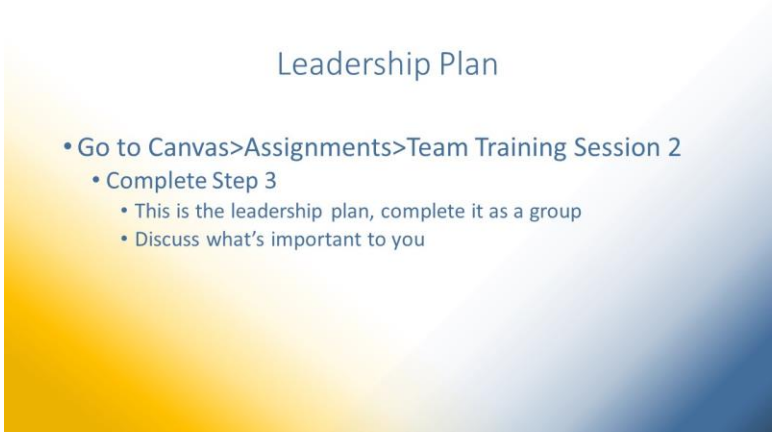
“Function gets at the different leadership behaviors. One person may be setting goals and directing the group while another ensures that everyone is sharing information and resolves conflicts. Now these are behaviors commonly associated with leaders, but someone might be enacting these behaviors and not considered a leader. Remember that in this form, leadership is when someone is recognized as a leader by themselves and their peers. That’s the difference between someone sharing leadership and someone performing their team role.”

"The differing functions of leaders is a key part of shared leadership as this is how they influence their teammates. Usually, it's when you are influenced by others are you recognizing them as leaders. So, when you are effectively engaging in these behaviors, you are likely influencing your teammates. And when several people do this, this is when shared leadership is born. The beauty of this is it allows leaders to do what they excel at-they aren't necessarily responsible for the whole team functioning and performance. If you excel at organizing and setting goals, you can lead the team by directing. If you excel at motivating teammates or mediating conflict, you can lead the team through your social influence. And together you share leadership and help your team achieve its goals."

Lecture part is over-now it's time to engage students again. Ask the students the following question: "What has leadership looked like in your team" – look for answers that show a hierarchical vs shared form, or different aspects of shared leadership.

At this time pass out the leadership plan sheet.

End with: "You've learned about leadership forms and engaged in an activity designed to have you reflect on what you thought made individuals leaders. I know want you to put this into action and make a plan for leadership within your team. Today we focused on less of how to develop you individually as a leader, but how to recognize leadership within your team and that it doesn't need to be one person in charge to be considered leadership. I see this form as allowing flexibility and for individuals to do what they do best."



"So, for your leadership plan, only one needs to be completed per team. Your reflection questions from earlier could be used to help create the leadership plan. Make sure you answer the question at the top -What will leadership look like in your team? - and then complete the rest about each teammate."

Be around for questions. Allows students to keep leadership plan document and individual worksheet.

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